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Southwest Research Inst, San Antonio, Tex

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EMISSION AND FUEL ECONOMY SENSITIVITY TO CHANGES IN LIGHT DUTY VEHICLE TEST PROCEDURES

by

Robert L. Srubar

FINAL REPORT
of
Task No. 10
Contract 68-03-2196

for
Environmental Protection Agency
Emission Control Technology Division
2565 Plymouth Road
Ann Arbor, Michigan 48105

May, 1977

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Approved:

Karl J Springer

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FOREWORD

This report is the third in a series of task reports under EPA Contract 68-03-2196, a task order contract for the Emission Control Technology Division, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105. The EPA Project Officer was Mr. Martin Reineman. The Southwest Research Institute Project Manager was Mr. Karl Springer. Mr. Robert Srubar served as Task Leader. The task was performed during August 1976 - April 1977, and was known as SwRI Project 11-4291-007.

ABSTRACT

This report describes the laboratory and statistical results of Task Number 10 to EPA Contract 68-03-2196. Five light duty vehicles representing present and projected vehicle populations and emission control systems were used to investigate emission and fuel economy sensitivity to changes in current test procedures for light duty vehicles. The length of soak period preceding the EPA Urban Dynamometer Driving Schedule (UDDS), and the speed versus time characteristics of the UDDS and EPA Highway Fuel Economy Test (FET) were varied. A "t" test was used to test for significant differences between baseline results and results obtained with modified driving cycles. Means, standard deviations, and coefficients of variation were calculated for groups of tests for each particular vehicle at each test condition.

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I. SUMMARY

Five light duty vehicles representing manufacturers' current emission control systems were used to investigate emission and fuel economy sensitivity to changes in current test procedrues for light duty vehicles. Length of soak period preceding the EPA Urban Dynamometer Driving Schedule (UDDS), and speed versus time characteristics of the EPA highway fuel economy test (HFET) and UDDS were also varied.

Tests using the UDDS were run following soak periods of 36, 16, 8, 4, 2, 1, 1/2, 1/3, and 1/6 hours, and tests using the modified UDDS (MUDDS) were run following 16 and 1/6 hour soak periods to simulate cold start and hot start conditions, respectively. Highway cycles were run following a 10 minute soak period preceded by a minimum of one urban driving cycle. During the first 505 seconds of each test using the urban driving cycles, eight CVS sample bags were taken, each representing the average dilute exhaust concentration for a period of approximately one minute. During all dynamometer tests, and during soak periods preceding tests used in the analysis of soak period length effects, the temperatures of five components on each vehicle were measured and continuously recorded.

To eliminate as many variables as possible, the testing of each vehicle was done following identical test plans. The order of tests used in the analysis of soak period length effects was reversed for one vehicle to investigate what differences, if any, would result. An engineering review of the laboratory results indicated the following:

1.) Emission results and fuel consumption during the UDDS were, with a few exceptions noted below, consistently and logically affected by soak period length. The following are general observations from the data.

    a.) HC increased with increases in soak period length over the entire range of soak periods tested.

    b.) CO emission rates were constant following soak periods of one hour and less, and increased sharply with longer soak periods over the range of 2 to 36 hours.

    c.) NO_x emission rates were constant following soak periods of 10 to 30 minutes in length, were constant but slightly higher following soak periods of one to four hours in length, and were constant and again higher following eight hour and longer soak periods.

d.) Fuel consumption increased very slowly with increases in soak period length in the 10 minute to one hour range, and increased gradually with longer soak periods of two hours and longer.

e.) The effect of varying the order of tests following different length soak periods could not be seen in emission rates or fuel consumption. When shorter soak period tests were run following only one preconditioning urban cycle rather than several, the only result was that fuel tank temperatures had not reached a steady value.

2.) Statistical "t" test comparisons of results obtained using modified and baseline urban and non-urban driving cycles did not indicate a consistent statistical difference for all vehicles tested. Some general observations from test data are offered, however, for consideration.

a.) HC results were both higher and lower during the MHFET as compared to baseline values. CO and NO_x were higher during the modified cycle, and fuel consumption showed a very slight increase over baseline cycle values.

b.) HC and NO_x were significantly different during the MUDDS following a 16 hour soak for a majority of the vehicles, but both higher and lower values were observed. CO and fuel consumption were not significantly different for a majority of the cars tested.

c.) During the MUDDS following a 10 minute soak, the emission rates were significantly different from those during the UDDS for each car, but again, individual tests showed increases and decreases. CO emission rates were not significantly different for a majority of the cars tested. NO_x and fuel consumption were significantly different from baseline results for a majority of the cars tested, and each showed a very minute increase during the modified cycle.

II. INTRODUCTION

On May 6, 1976, Task Order No. 10 titled, "Emissions and Fuel Economy Sensitivity to Changes in Light Duty Vehicle Test Procedures" was authorized by the EPA Contracting Officer of Contract 68-03-2196, Mr. Albert W. Ahlquist. The project consisted of a laboratory task plus final reporting.

The scope of work and plan of test were sufficiently developed so that little input by SwRI was needed. SwRI functioned mainly as a test laboratory and provided statistical analysis of the data as specified.

III. OBJECTIVE AND PLAN OF TEST

This section briefly describes the preparations and experimental plan, procedures and equipment, vehicles and fuel employed.

A. Objective

The objective of this project was to determine the exhaust emission and fuel economy sensitivity to changes in current test procedures for light duty vehicles. Speed versus time characteristics and length of soak period were varied for the EPA Urban Dynamometer Driving Schedule (UDDS), and the speed versus time characteristics of the EPA Highway Fuel Economy Test (HFET) were also varied. Five vehicles representing current vehicle populations and emission control systems were tested following similar test sequences.

B. Scope

The scope of work included vehicle procurement, inspection, testing and statistical analysis plus the preparation of a final report. Basically, the experimental effort for each vehicle consisted of 24 emission tests using urban driving schedules and six highway fuel economy tests. The analytical effort included statistical comparisons of fuel economy and emission results obtained with modified and baseline driving cycles.

C. Vehicle Selection

As specified by the Task Order, the five vehicles tested in this project were:

(1) one current model year GM automobile, large displacement engine, high inertia weight, pelleted oxidation catalyst

(2) one current model year Ford automobile, large displacement engine, high inertia weight, monolith oxidation catalyst

(3) one current model year Chrysler automobile, large displacement engine, high inertia weight, monolith oxidation catalyst

(4) one current model year automobile, small displacement engine, low inertia weight, oxidation catalyst

(5) one current model year vehicle, small displacement CVCC engine

The actual vehicles tested are described in Table 1. Each of the vehicles, all in some stage of testing, are shown in Figure 1. These vehicles were as described in the original Scope of Work with the exception of the Chrysler automobile. In a telephone conversation with the Task Officer July 9, 1976, it was pointed out that a non-catalyst Chrysler automobile, as originally suggested, was rather difficult to locate and was not a common car. In a telephone convertion July 12, 1976, the Task Officer requested that a catalyst equipped Chrysler automobile be tested instead.

D. Vehicle Preparation

Prior to rental of each vehicle, the vehicle and engine were given a visual examination to make certain that the components and exhaust system were intact insofar as they could be observed. Enroute to SwRI and prior to acceptance of the vehicle for use in this project, the driveability and general road performance of the vehicle were observed to ensure that the engine and car performed satisfactorily.

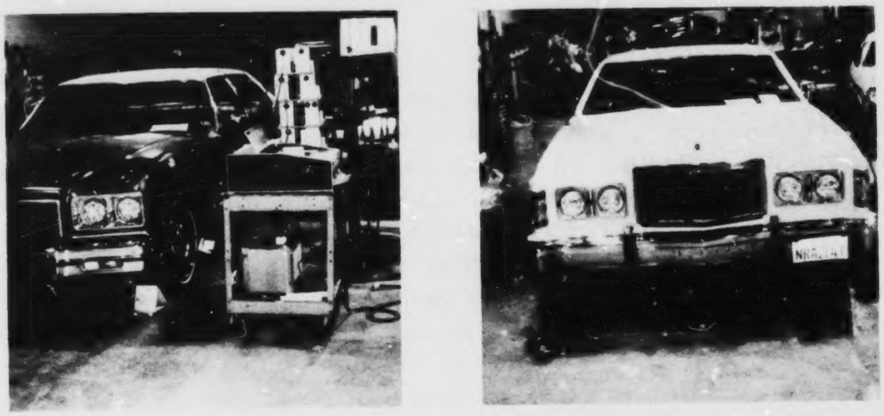
Next, the vehicle engine was subjected to a tune check to make certain all manufacturer's recommendations were met. These vehicles were all relatively new and therefore a tune-up, in which parts were replaced, was neither necessary nor was it desired. The tune check was to make certain the engines were within factory tolerances of basic spark timing, idle rpm, and idle mixture setting. On the Honda Civic, the only vehicle tested which did not have an electronic ignition system, the distributor dwell was also checked. If these parameters were not within the manufacturer's limits, they were adjusted prior to the beginning of testing.

As a further check on the condition of each vehicle, a three-bag 1975 FTP, from cold start, was run. Because all tests in the actual experiment were either highway cycles or two bag urban cycles, this additional test was conducted to compare each vehicle with certification levels and applicable statutory limits.

During these inspections, it was determined that all original equipment was intact and apparently functioning satisfactorily. The Chevrolet Vega was discovered to have an apparently clogged air cleaner element, which resulted in extremely high CO values during the initial emission test. With this exception, no parts were replaced on any of the vehicles.

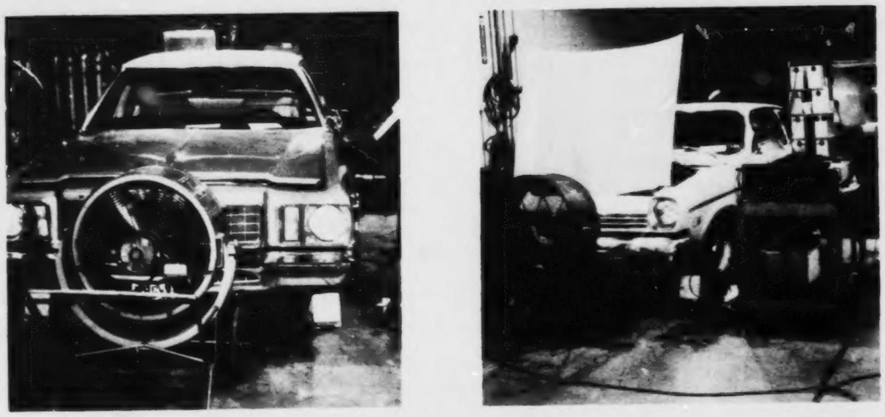
TABLE 1. DESCRIPTION OF TEST VEHICLES

Vehicle No.	1	2	3	4	5
Model Year	1976	1977	1976	1976	1976
Manufacturer	Chevrolet	Ford	Plymouth	Chevrolet	Honda
Model	Impala	LTD	Fury	Vega	Civic
Type of Vehicle	Sedan	Sedan	Sedan	Sedan	Sedan
Number of Doors	4	2	4	2	2
Odometer, km	20,515	7,787	20,590	14,320	17,168
Number of Cylinders	8	8	8	4	4
Displacement, litre (CID)	5.73 (350)	5.75(351)	5.90 (360)	2.29 (140)	1.49 (91)
Carburetor Venturis	2	2	2	2	3
Transmission Type	Auto	Auto	Auto	Auto	Man.
Speeds	3	3	3	3	4
Tire Size	HR78-15	HR78-15	GR78-15	A78-13	600S12
Tire Type	Radial	Radial	Radial	Fiberglass Belted	Radial
Emission Controls	CAT EGR EFE CAN	CAT EGR AIR CAN	CAT EGR CAN	CAT EGR CAN	TR CAN
Test Weight (Inertia), kg	2268	2268	2041	1361	907
(lbs)	(5,000)	(5,000)	(4,500)	(3,000)	(2,000)



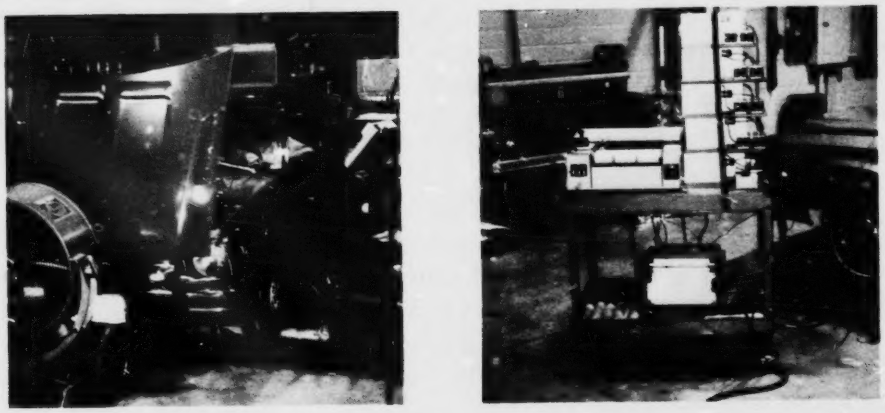
1976 Chevrolet Impala

1977 Ford LTD



1976 Plymouth Fury

1976 Chevrolet Vega



1976 Honda Civic CVCC

Temperature Measurement Apparatus

FIGURE 1. TEST VEHICLES AND EQUIPMENT

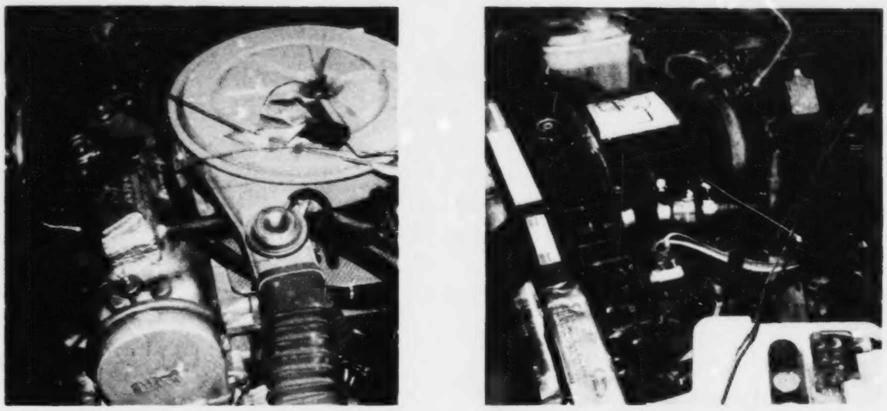
If the vehicle proved acceptable up to this point, it was then instrumented to measure carburetor inlet air, engine water out, oil pan, fuel tank vapor, and fuel tank liquid temperatures. Typical thermocouple installations are shown in Figure 2. Carburetor inlet air was measured inside the air cleaner at the top of the carburetor air horn, approximately in the center of the air inlet. This was done on each vehicle by passing fine thermocouple wire through the air cleaner cover adjacent to the air cleaner anchor screw. Engine water-out temperature was monitored by adapting the upper radiator hose to facilitate thermocouple installation, and a dipstick thermocouple was used to measure oil sump temperature. The filler neck shown in Figure 2 is the tank end of the neck. When inserted in the fuel tank, the thermocouple adjacent to the neck measured vapor temperature, and the longer thermocouple wire was submerged in liquid fuel. A different method was used on the Honda Civic, which had fuel tank connections that allowed simpler thermocouple installation.

E. Test Sequence

The experimental test plan followed for each car is outlined in Table 2. Part I of the test plan covers experiments to compare EPA baseline driving cycles to modified cycles. The modified UDDS (MUDDS) consists of the same segments as the UDDS, but the segments are rearranged to occur in a difference sequence. The total time and distance traveled are the same for both cycles. The modified highway cycle had a top speed of 116 kilometres per hour (72 mph), an average speed of 80 kilometres per hours (49.7 mph) and covered 17.0 kilometres (10.56 miles). For comparison, these values for the HFET are 92 (57), 78 (48), and 16.5 (10.24) respectively. The time elapsed during both cycles is the same. Part II of the test plan covers tests used to study the effect of soak period length on emission rates and fuel economy during the UDDS. Tests were conducted following soak periods of 36, 8, 4, 2, 1, 1/2, 1/3 and 1/6 hours.

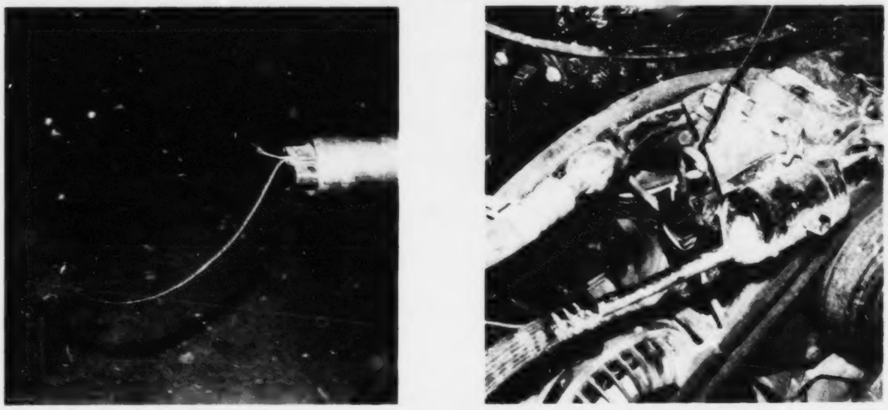
As specified in the Scope of Work, three replicates were run for each highway cycle and for urban cycles following 16 hour soak periods. Two replicates were made of all other tests. The results of the 16 hour soak tests using the UDDS were used both in comparisons of modified and baseline driving cycles and in the study of soak period length effects. The 10 minute soak UDDS tests in part II were also used in the comparison of modified and baseline cycles.

To avoid differences between the testing of each vehicle, all tests were performed in the sequence listed in Table 2, grouping



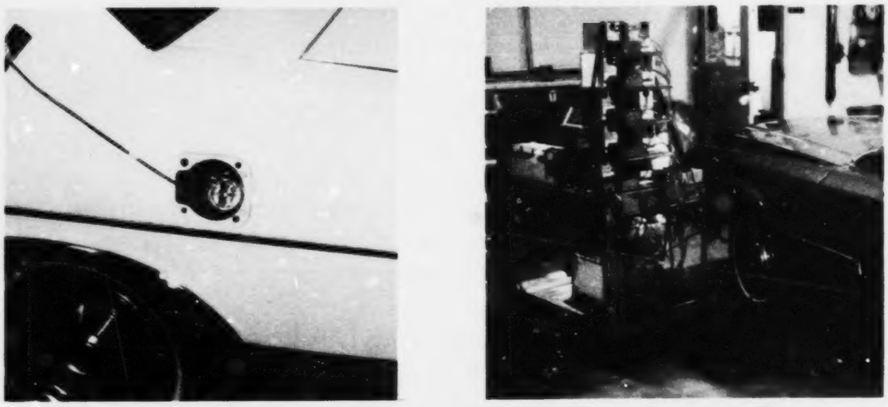
Carburetor Inlet Air Thermocouple

Engine Water Out Thermocouple



Fuel Tank Thermocouple

Dipstick Thermocouple



Leads to Fuel Tank Thermocouple

Temperature Cart with Vehicle in Soak

FIGURE 2. THERMOCOUPLE LOCATIONS, TEMPERATURE MEASURING EQUIPMENT

TABLE 2. EXPERIMENTAL TEST PLAN
PART I

1. Measure, record, and adjust to manufacturer's specification idle rpm, ignition timing, dwell (if applicable), and idle mixture per manufacturer's procedure.

2. Drive one 23-minute UDDS as preconditioning.

3. Let vehicle soak for exactly 16 hours, continuously recording vehicle temperatures during the entire soak period.

4. Run a 2-bag LA-4. For the first 505 seconds of the cycle, in addition to bag 1 and the background sample, a sequence of 8 bags will be taken, each containing sample for the time interval specified on the driving trace. Continuously record vehicle temperatures during the entire test.

5. Let vehicle soak for 10 minutes.

6. Run an HFET, continuously recording the vehicle temperatures during the entire test.

7. Repeat Steps 2-6.

8. Repeat Steps 2-6 again.

9. Measure and record idle rpm, ignition timing, and dwell (if applicable).

10. Run one MUDDS as preconditioning.

11. Let vehicle soak for exactly 16 hours.

12. Run a 2-bag MUDDS test. As in Step 3, in addition to bag 1, a sequence of 8 bags will be taken, each containing sample for the time interval specified on the driving trace. Continuously record vehicle temperatures during the entire test.

13. Let vehicle soak 10 minutes.

14. Repeat Step 12.

15. Let vehicle soak 10 minutes.

16. Run a MHFET, continuously recording vehicle temperatures during the entire test.

17. Repeat Steps 10-16.

TABLE 2 (Cont'd.) EXPERIMENTAL TEST PLAN

18. Repeat Step 9.

19. Repeat Steps 10-13.

20. Repeat Step 16.

PART 2

1. Measure and record idle rpm, ignition timing, and dwell (if applicable).

2. Drive one 23-minute UDDS as preconditioning.

3. Let vehicle soak for exactly 36 hours, continuously recording vehicle temperatures during the entire soak period.

4. Run a 2-bag LA-4. For the first 505 seconds of the cycle, in addition to bag 1 and the background sample, a sequence of 8 bags will be taken, each containing sample for the time interval specified on the driving trace. Continuously record vehicle temperatures during the entire test.

5. Repeat Steps 2-4.

6. Repeat Steps 1-5, but with length of soak period changed to exactly 8 hours.

7. Repeat Steps 1-5, but with length of soak period changed to exactly 4 hours.

8. Repeat Steps 1-5, but with length of soak period changed to exactly 2 hours.

9. Repeat Steps 1-5, but with length of soak period changed to exactly 1 hour.

10. Repeat Steps 1-5, but with length of soak period changed to exactly 30 minutes.

11. Repeat Steps 1-5, but with length of soak period changed to exactly 20 minutes.

12. Repeat Steps 1-5, but with length of soak period changed to exactly 10 minutes.

Note: In the event that the soak period between tests exceeds the prescribed time interval, a 23 minute LA-4 must be run as preconditioning and the prescribed sequence of soak periods and tests resumed.

tests each day in the same manner for each car. In the event a particular test was repeated for any reason, the vehicle was preconditioned to a state comparable to the original sequence.

For the Ford LTD, tests used in the portion of the experiment evaluating different length soak periods were performed in the sequence opposite that in Part 2 of the experimental test plan. Tests following the shorter soak periods were conducted first, followed by tests using longer and longer soak periods. This was done at the request of the Task Officer to investigate the effects of different evaporative emission system loading.

F. Test Procedures and Equipment

Minimal test-to-test variability was considered very important in the conduct of this project. To this end, the same laboratory equipment, driver, analytical cart, and CVS were used throughout. Prior to each test sequence, the vehicle was given a preconditioning run on the chassis dynamometer following the driving cycle to be used in the following test. Tests using the UDDS were preceded by a UDDS, and tests using the MUDDS were preceded by an MUDDS. Highway Fuel Economy Tests (HFET) were preceded by a UDDS, and tests using the modified HFET cycle (MHFET) were preceded by an MUDDS.

All exhaust emission test work was done in accord with the method specified in 40CFR 85.075 with the exception of evaporative emission testing, which was of no interest to this project. In addition to the exhaust emission testing for gaseous emission in terms of the 1975 FTP (HC, CO,and NO_x), fuel economy by the carbon balance method was also determined.

Temperature Measurement

Carburetor inlet air, engine water out, oil pan, fuel tank vapor, and fuel tank liquid temperatures were continuously recorded during all emission and fuel economy tests and during the soak periods prior to emission tests used in the analysis of the effects of soak period length. These temperatures, measured with iron-constantan thermocouples, were continuously recorded using a six pen recorder. The sixth pen on the recorder was used to record vehicle miles per hour. In addition to this temperature record, the output of each thermocouple, corrected for room temperature, was electronically integrated during all tests and applicable soak periods, allowing an average emf to be calculated. Over the narrow range of temperatures encountered, the output of the I-C thermocouple is approximately linear, making it possible to determine an average temperature from the average emf. Various views of the temperature measuring apparatus can be seen in Figure 1.

Sequential Sampling

During the first 505 seconds of UDDS and MUDDS, in addition to the 505 second exhaust sample, eight CVS bag samples were collected, each representing the average concentration for a 63 second segment of the driving cycle. The period represented by each bag, the distance traveled, and the average speed in each period are shown in Table 3. Figure 3 is a speed versus time plot of the first 505 seconds of each driving cycle with the 63 second divisions shown.

The CVS used was modified to allow a continuous sequence of dilute exhaust sample bags to be taken in addition to the two sample bags normally taken. To simplify analysis, the values from the 505 second background sample were used in the calculation of mass emissions from the sequential samples. A schematic of the modified CVS is shown in Figure 4. The revolutions of the positive displacement pump and time were measured during each of the sequential samples, allowing an accurate determination to be made of gaseous emissions on a mass basis for each period. Figure 5 shows various views of the sequential sampling system in operation.

Diagnostic Checks

To rule out changing engine tune parameters as a source of variability, engine diagnostic checks were performed with a frequency of approximately every fifth emission test, as indicated in Table 2. The diagnostic checks included idle rpm, ignition timing, and distributor dwell if applicable. Throughout testing, no change in these parameters could be measured in any of the vehicles. Thus, no adjustments of any kind were made to the vehicles once testing had begun.

G. Test Fuel

Vehicle 5, the 1976 Honda Civic CVCC, was not equipped with an oxidation catalyst in the exhaust system. To eliminate fuel as a variable in the experiment, all vehicles were run on unleaded fuel. Table 4 lists the properties of the fuel used. The fuel met the requirements of 40CFR 85.075-10 for unleaded exhaust and evaporative emission test gasoline.

TABLE 3. EIGHT BAG SEQUENCE SAMPLE TIMES, DISTANCES TRAVELED, AND AVERAGE SPEEDS

Bag No.	Time, sec (nominal)	Occurrence in Driving Cycle (sec)	Distance, km (miles)		Average Speed, kph (mph)	
			UDDS	MUDDS	UDDS	MUDDS
1	63	0-63	0.35 (0.22)	0.60 (0.37)	20 (12)	34 (21)
2	63	64-126	0.72 (0.45)	0.37 (0.23)	41 (26)	21 (13)
3	63	127-189	0.24 (0.15)	0.66 (0.41)	14 (9)	38 (23)
4	63	190-252	1.37 (0.85)	0.39 (0.24)	78 (49)	22 (14)
5	63	253-315	1.40 (0.87)	0.29 (0.18)	80 (50)	17 (10)
6	63	316-378	0.55 (0.34)	0.39 (0.24)	31 (20)	22 (14)
7	63	379-441	0.42 (0.26)	0.43 (0.27)	24 (15)	25 (15)
8	64	442-505	0.73 (0.45)	0.56 (0.35)	41 (26)	32 (20)

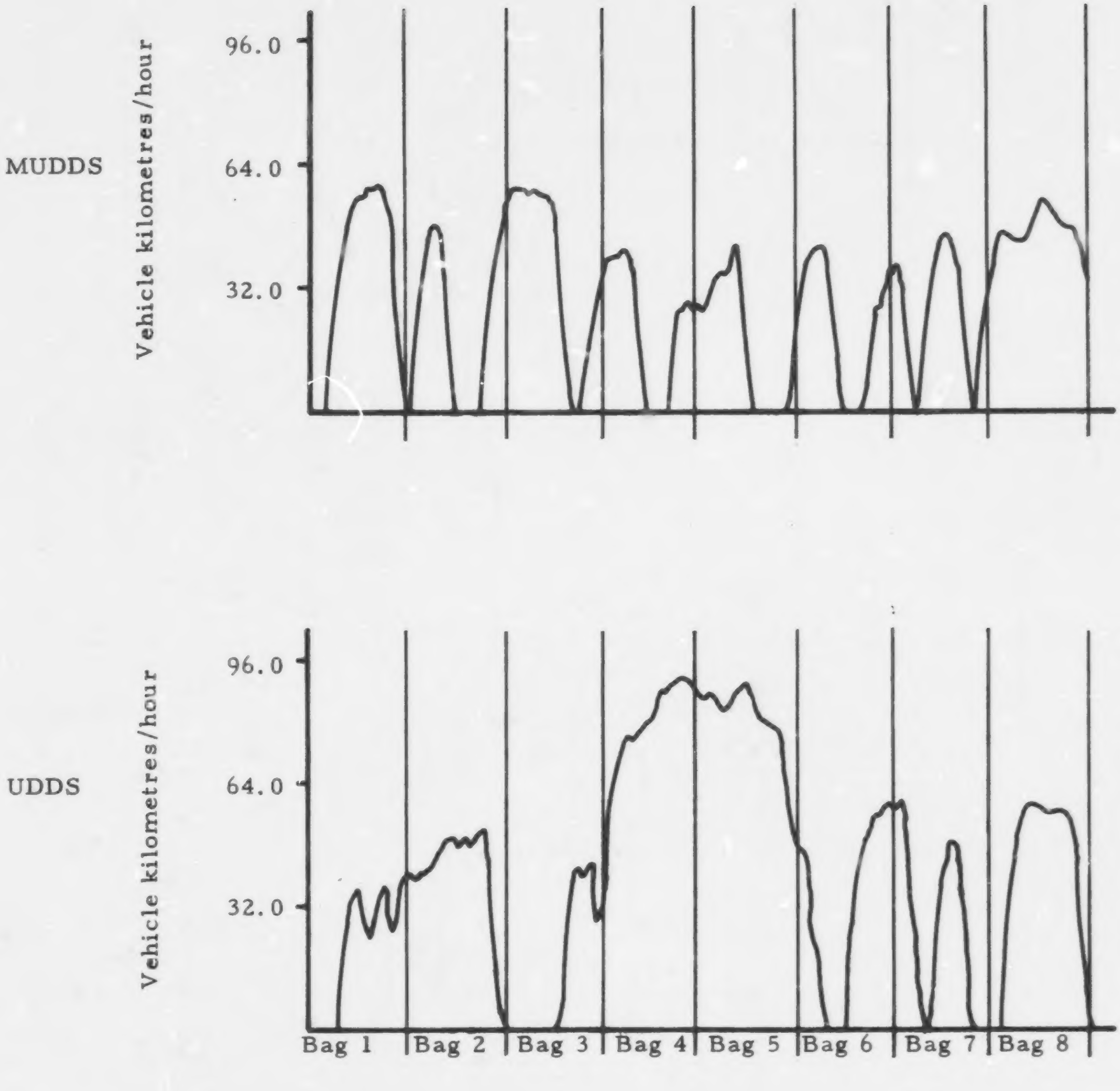


FIGURE 3. SPEED VERSUS TIME PLOT OF FIRST 505 SECONDS OF UDDS AND MUDDS WITH SEQUENTIAL SAMPLING PERIODS INDICATED

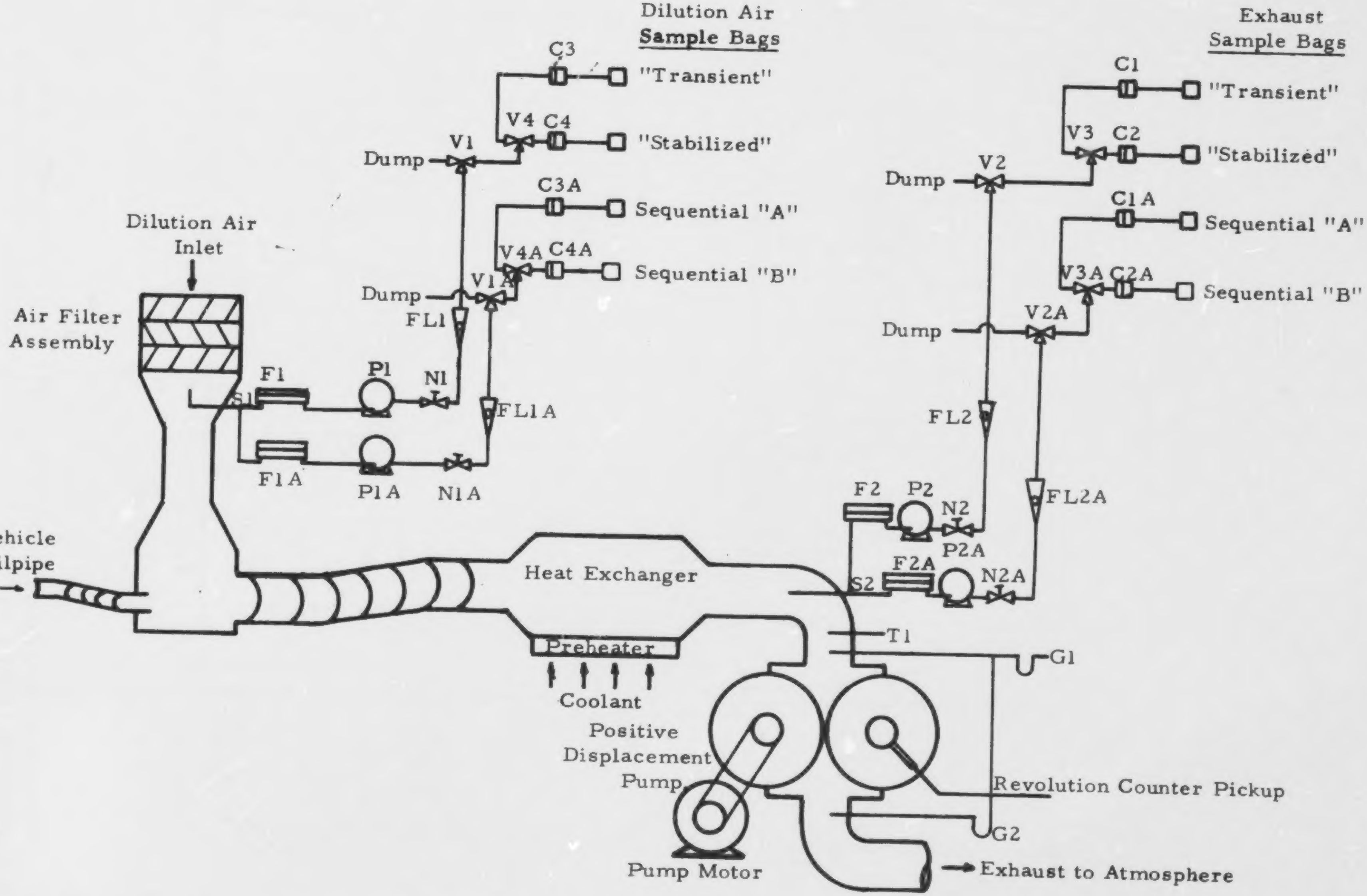
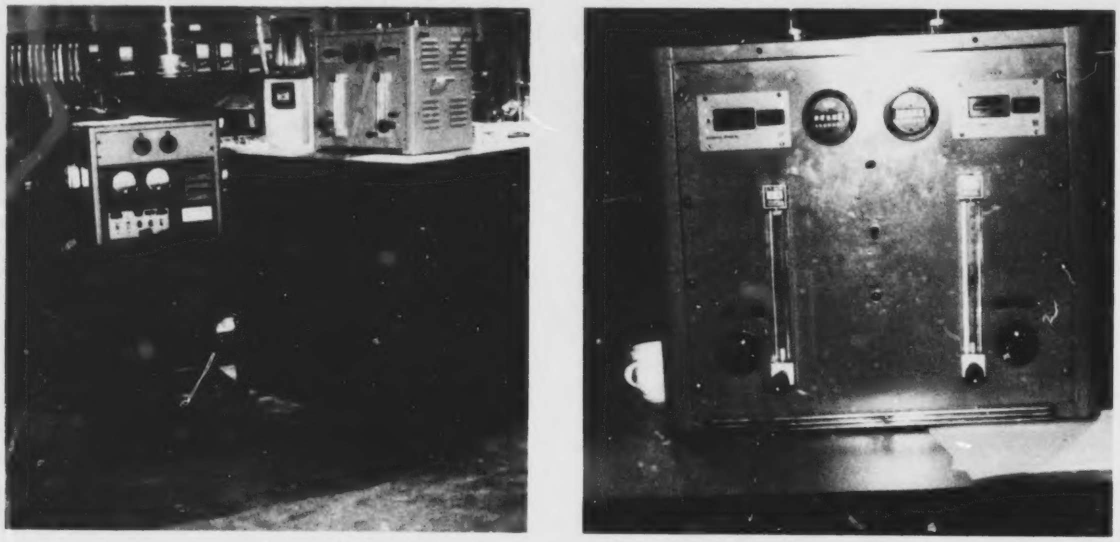
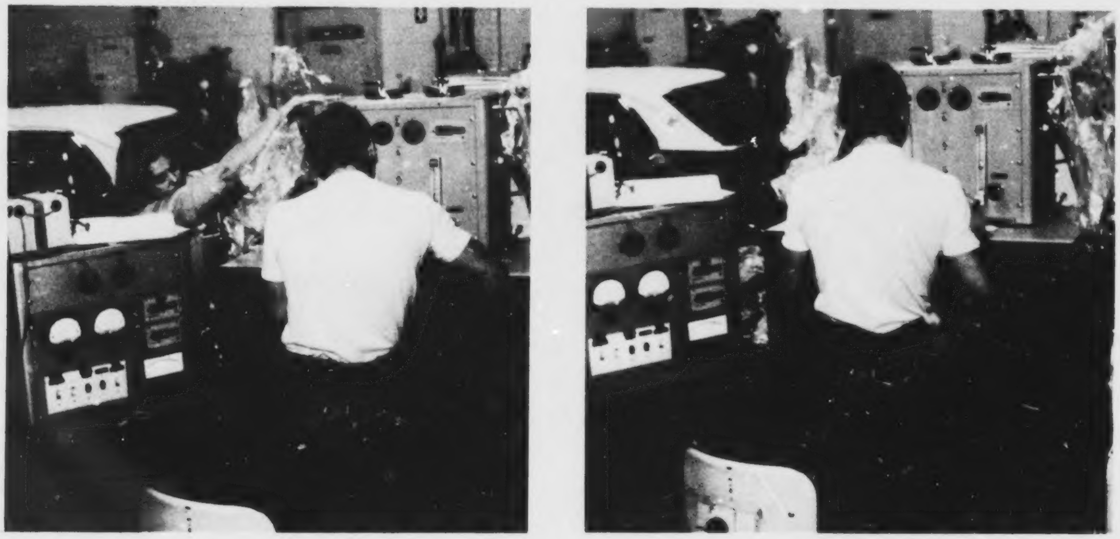

Dilution Air
Sample Bags
C3
"Transient"
V4 C4
"Stabilized"
V1
Dump
C3A
Sequential "A"
V4A C4A
Sequential "B"
V1A
Dump
FL1
FL1A
Dilution Air
Inlet
Air Filter
Assembly
F1
S1
P1
N1
F1A
P1A
N1A
Vehicle
Tailpipe
Heat Exchanger
Preheater
Coolant
Positive
Displacement
Pump
Pump Motor
Exhaust
Sample Bags
C1
"Transient"
V3 C2
"Stabilized"
V2
Dump
C1A
Sequential "A"
V3A C2A
Sequential "B"
V2A
Dump
FL2
FL2A
F2
P2
N2
P2A
F2A
N2A
S2
T1
G1
Revolution Counter Pickup
G2
Exhaust to Atmosphere

FIGURE 4. FLOW SCHEMATIC OF CVS MODIFIED FOR SEQUENTIAL SAMPLING



Sequential Bag Sampler Mounted on CVS

Control Panel for Sequential Bag Sampling



Operator Changing Sequential Sample Bags

Sequential Bag Sampler in Operation

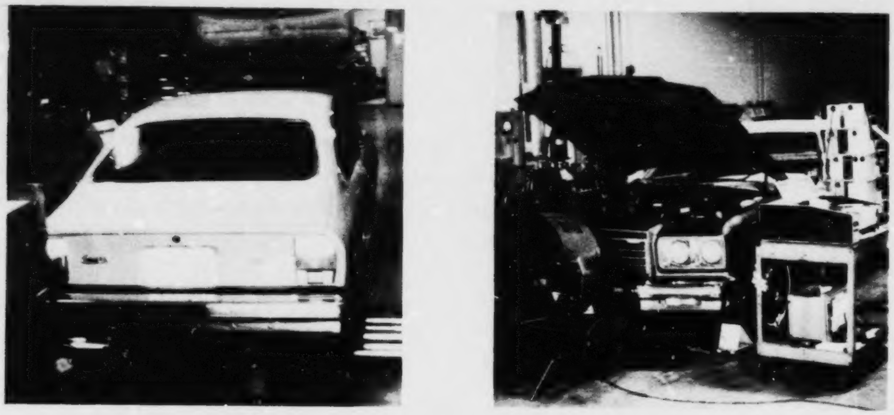
FIGURE 5. SEQUENTIAL BAG SAMPLING SYSTEM

TABLE 4. FUEL INSPECTION DATA

Fuel Code	EM-259-F
Source	Howell Refining
Gravity, deg API (D287)	57.0
Distillation Range (D 86)	
Initial Boiling Point, °F	88
5% Point, °F	114
10% Point, °F	132
20% Point, °F	163
30% Point, °F	188
40% Point, °F	207
50% Point, °F	219
60% Point, °F	230
70% Point, °F	243
80% Point, °F	265
90% Point, °F	319
95% Point, °F	347
End Point	396
% Recovery	98.0
% Residue	1.0
% Loss	1.0
Octane No., Research (D1656)	96.6
Total Sulfur, % wt (D1266)	0.002
Reid Vapor Pressure, psi (D323)	8.8
Hydrocarbon Composition (D1319)	
Olefins, %	4.4
Aromatics, %	32.5
Saturates, %	63.1
Lead (Organic) g/gal (D526)	0.023
Phosphorus, Theory	<.001
Oxidation Stability (D525)	600+
Existent Gum, mg (D381)	0.6

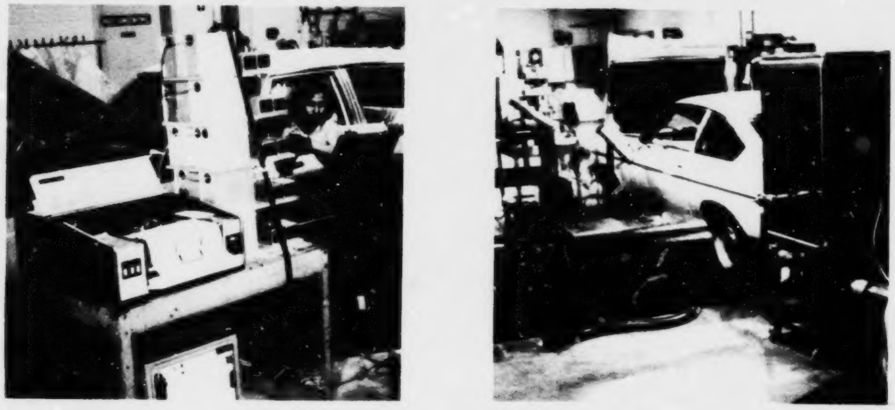
H. Test Set-Up

Figures 1 and 6 show various views of the five vehicles as set up in all stages of testing. Partially shown in these photographs are the various test equipment used and the chassis dynamometer, driver aid, constant volume sampler, etc.



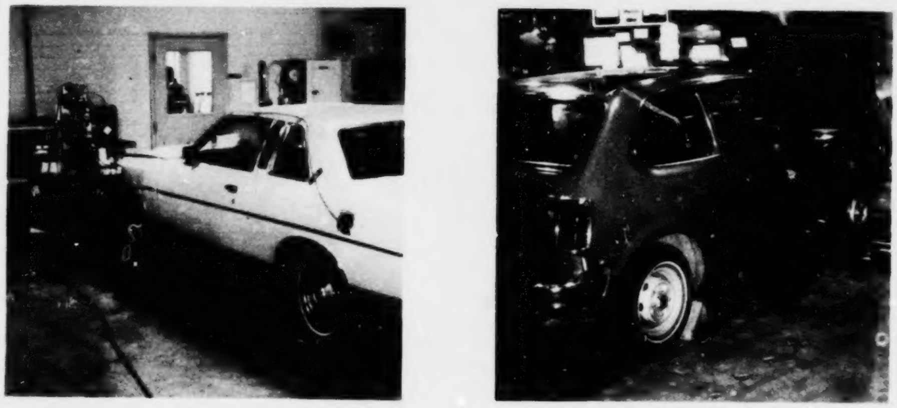
Chevrolet Vega, Chassis Dynamometer

Chevrolet Impala, Vehicle Cooling Fan



Plymouth Fury, Driver's Aid

Chevrolet Vega, Dynamometer Inertia System



Ford LTD in Soak

Front Wheel Drive Honda Civic

FIGURE 6. VEHICLES DURING TESTING, VARIOUS TEST EQUIPMENT

IV. DISCUSSION

In this section, the emission and fuel economy results of tests on the five cars are presented and discussed as a group. Comments are made regarding the effects of soak period length on each exhaust constituent and on fuel consumption during the UDDS. The effects of varying segment order in the UDDS, and varying the speed versus time characteristics of the HFET on exhaust emissions and fuel economy are discussed for the five cars as a whole by comparing results obtained with modified driving cycles to those of baseline cycles. The statistical comparisons of results of baseline and modified cycles are summarized and commented on.

A. Length of Soak Period

Emission rates and fuel consumption for each vehicle tested following soak periods of 36, 16, 8, 4, 2, 1, 1/2, 1/3, and 1/6 hours are shown in Figures 7 and 8. Values plotted for each car are as percent of average results obtained following a 16 hour soak period. Thus, results are normalized to the 16 hour soak which is typically the overnight soak period for emission testing.

HC emission rates were very strongly, and fairly predictably, affected by soak period length over the entire range of soak lengths tested. With the exception of only one car of the five tested, HC values following soak periods of eight hours and less were lower than the 16 hour value. With only one exception, values following a 36 hour soak period either equalled or exceeded results following a 16 hour soak. HC emission rates increased fairly sharply with increase in soak period length.

CO emission rates were affected strongly, and somewhat systematically by soak period length. With few exceptions, CO was moderately constant following soak periods of up to two hours. The CO values in this interval for the Honda Civic were greater in proportion to the 16 hour soak values than was the case for the other cars. Very likely this is a result of the Honda not being catalyst equipped, as were the other four cars. CO emission rates following 4 hour and longer soak periods increased sharply with soak period length for all vehicles. With only one exception, CO was higher following a 36 hour soak than following a 16 hour soak period.

NO_x emission rates were strongly a function of soak period length, increasing with increases in soak length. The NO_x values for the Ford LTD did not follow as orderly a progression as did values for the other vehicles. Because NO_x following a 16 hour soak period was somewhat lower than all other values for that car, the

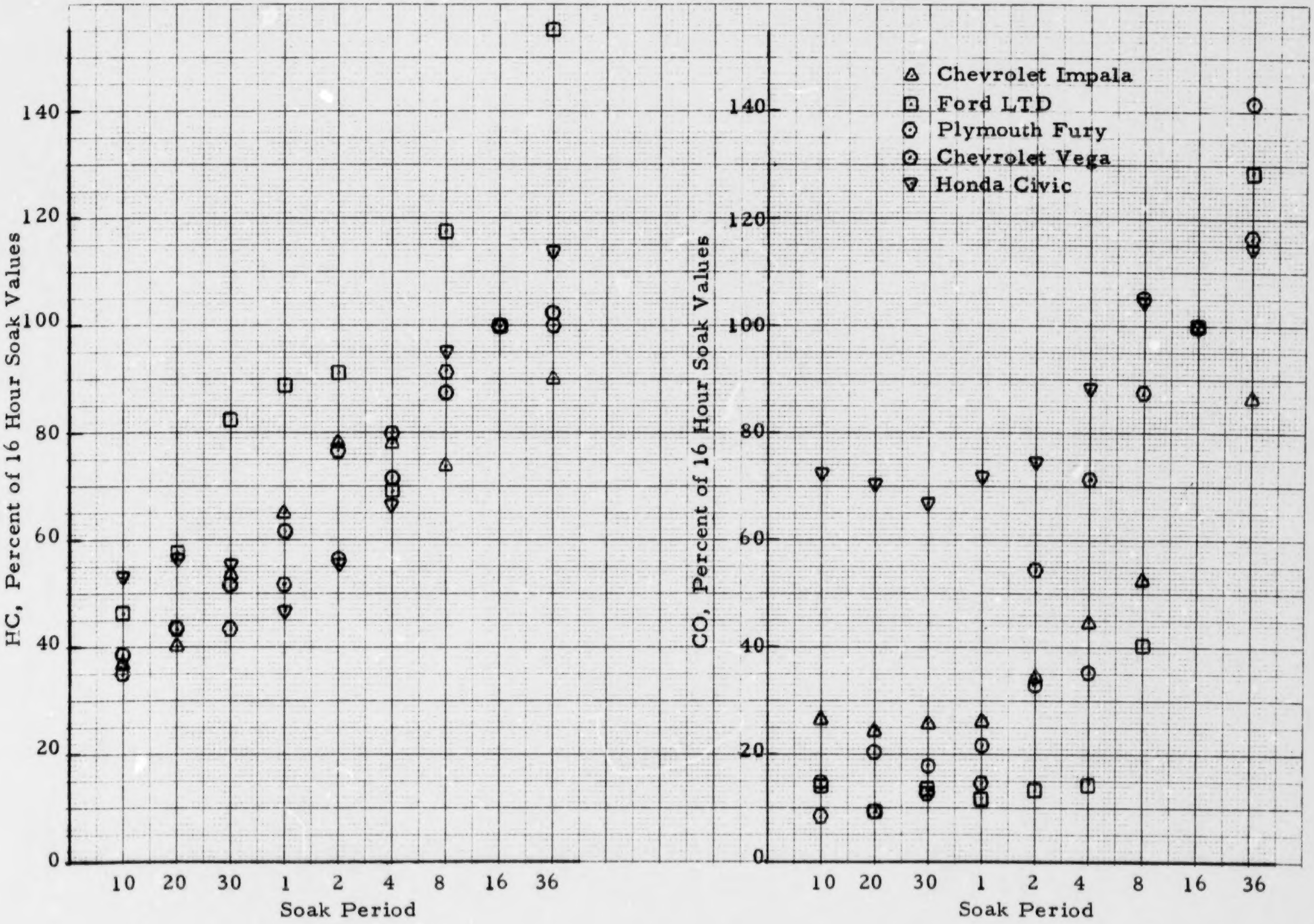


FIGURE 7 . HC AND CO EMISSION RATES DURING THE EPA UDDS FOLLOWING SPECIFIC LENGTH SOAK PERIODS

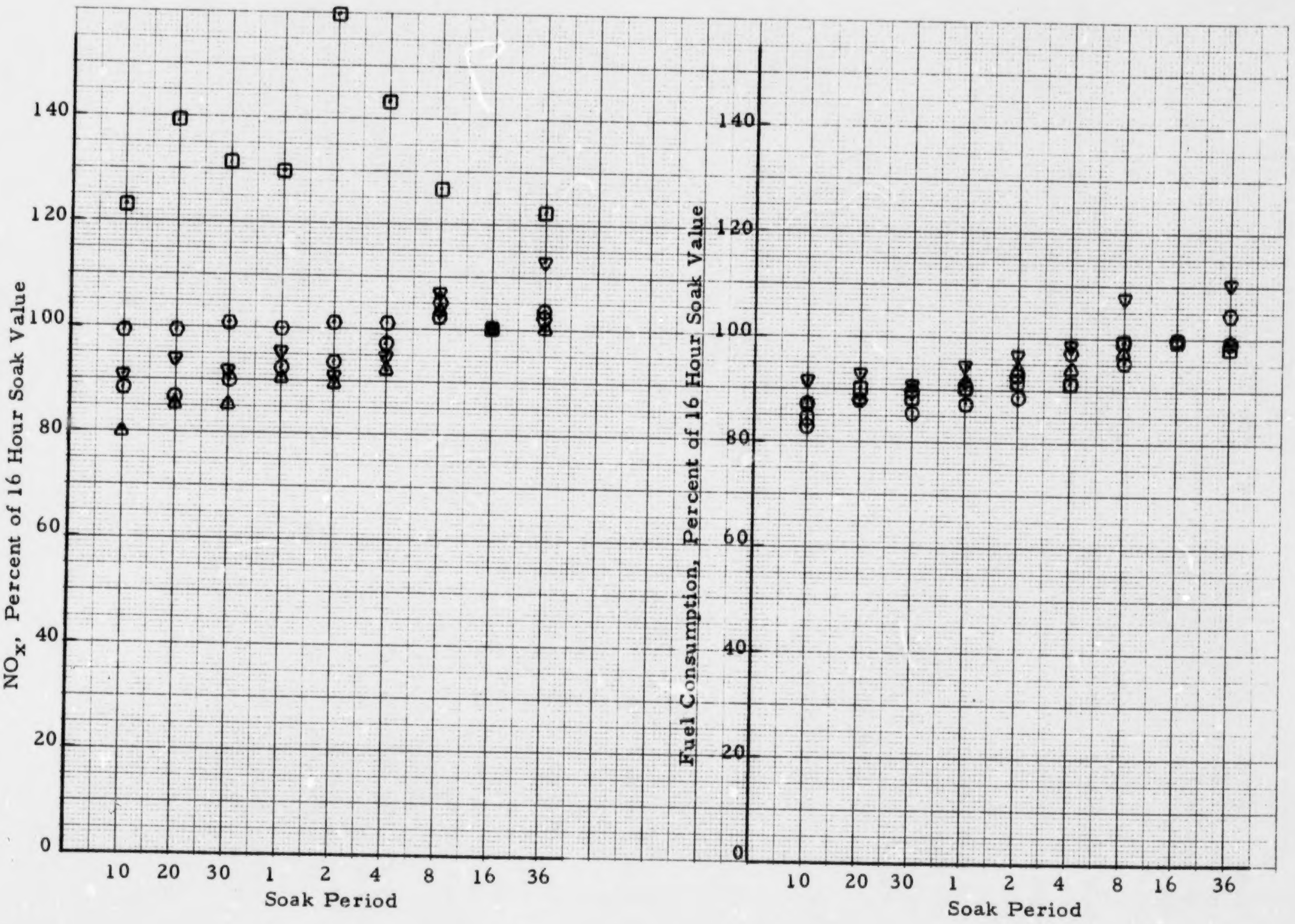


FIGURE 8. NO$_x$ EMISSION RATES AND FUEL CONSUMPTION DURING THE EPA UDDS FOLLOWING SPECIFIC LENGTH SOAK PERIODS

normalized results for the LTD are high, and appear to show considerable scatter. If the 16 hour soak results had been higher, then data for the Ford would possibly have fallen in line with the other values.

Fuel consumption, even though not affected to as large an extent as emission rates, increased almost methodically with increases in soak length. The variation at each length soak period was fairly small, with most conditions showing a range of 10 percent or less.

The strong effect soak period length had on emission rates and fuel consumption can be seen from Figures 7 and 8. Also, because the data taken in sequential samples agrees with the cold transient results, the sequential samples show this effect. The effect of soak length is fairly predictable; emission rates and fuel consumption increase with soak length for the range of soak periods investigated.

B. Modified Versus Baseline Driving Cycles

A summary of statistical "t" test comparisons of emission rates and fuel consumption during baseline and modified driving cycles for each car are shown in Table 5. In a few instances the majority of the vehicles show a statistical difference between two cycles that is consistent in sign convention. The NO_x values during the MHFET were statistically different for four cars, and the difference is an increase over baseline values in each case. Following a 10 minute soak period, the statistical test indicated a difference in NO_x between the UDDS and MUDDS for all five cars, and four of those vehicles showed an increase. Also following a 10 minute soak period, the "t" test indicated a difference in fuel consumption between the two urban cycles for four cars. The difference was an increase for all four cars.

Caution should be used in considering these statistical comparisons. Although the "t" test indicates that a difference actually does exist, the significance of that difference from a practical viewpoint is equally, if not more, important. The proportion of the resulting difference to results from the baseline driving cycle is shown in Table 5 as the percent of average baseline cycle results. In many cases, especially fuel consumption, differences are 10 percent or less of the actual average value. As an illustration, fuel consumption during the HFET averaged 10.29 ℓ/100 km for the five vehicles.

TABLE 5. SUMMARIZED DATA FROM "t" TEST COMPARISONS OF BASELINE AND MODIFIED DRIVING CYCLES

		HC			CO			NO_x			F.C.		
	Car	Sign.(1) Diff.	d(2)	Δ%(3)	Sign. Diff.	d	Δ%	Sign. Diff.	d	Δ%	Sign. Diff.	d	Δ%
HFET vs MHFET													
Chev. Impala	1	yes	-0.01	-14.29	yes	-0.12	-21.82	no	+0.15	+12.82	yes	+0.39	+2.81
Ford LTD	2	yes	+0.01	+12.50	yes	+0.06	+75.00	yes	+0.21	+30.00	no	-0.46	-3.83
Ply. Fury	3	yes	+0.01	+11.11	yes	+0.32	+152.38	yes	+0.16	+6.56	yes	+0.92	+8.30
Chev. Vega	4	yes	+0.01	+20.00	no	+0.07	+41.18	yes	+0.15	+18.75	no	+0.07	+0.87
Honda Civic	5	yes	+0.03	+27.27	yes	+0.50	+33.33	yes	+0.41	+34.17	yes	+0.43	+6.72
16 Hour Soak UDDS vs MUDDS													
Chev. Impala	1	yes	-0.05	-8.33	no	-2.35	-21.52	yes	-0.04	-3.45	no	-0.16	-0.76
Ford LTD	2	yes	+0.03	+6.52	no	-0.30	-3.42	yes	+0.10	+13.16	no	+0.11	+0.60
Ply. Fury	3	yes	-0.05	-8.33	no	+0.95	+12.91	yes	+0.02	+1.00	no	+0.26	+1.44
Chev. Vega	4	no	0.00	0.00	no	-0.31	-6.71	yes	-0.06	-7.50	yes	-0.41	-3.43
Honda Civic	5	yes	+0.32	+38.55	yes	+0.89	+21.71	yes	+0.11	+11.00	yes	+0.83	+9.73
10 Minute Soak UDDS vs MUDDS													
Chev. Impala	1	yes	+0.01	+4.55	no	-0.33	-11.42	yes	+0.06	+6.45	yes	+0.94	+5.12
Ford LTD	2	yes	+0.05	+23.81	no	-0.11	-8.80	yes	+0.12	+12.77	yes	+1.57	+10.09
Ply. Fury	3	yes	-0.03	-14.29	yes	+0.18	+28.13	yes	+0.11	+5.50	yes	+1.82	+12.16
Chev. Vega	4	yes	-0.02	-13.33	no	-0.02	-3.03	yes	-0.03	-4.23	yes	+0.02	+0.19
Honda Civic	5	yes	-0.04	-9.09	yes	+0.03	+1.01	yes	+0.08	+8.79	no	+0.52	+6.65

---

(1) Per "t" test

(2) Modified Cycle - Baseline Cycle

(3) $\frac{d}{\text{Baseline Cycle}} \times 100\%$

In proportion to this, the nominal 0.45 ℓ/100 km difference is remarkably small. Another point to consider is the number of replications of each test. Only two replications of the UDDS and MUDDS (following 10 minute soak periods), three replications of the HFET and MHFET (following a 10 minute soak) and three replications of the UDDS and MUDDS (following 16 hour soak periods) were run for each car. Even though the "t" test is valid for small samples, results obtained from this number of tests could be misleading.

Figure 9 shows results of the MHFET, and Figure 10 shows results of the MUDDS following 10 minute soak periods and 16 hour soak periods. In these figures, results of the modified cycles are plotted as a percent of the results obtained with the baseline cycles they are being compared to.

For the MHFET, CO and NO_x were distinctly higher than baseline cycle values for a majority of the cars tested. No change in fuel consumption was noted. For the MUDDS following a 10 minute soak period, both NO_x and fuel consumption were higher for four cars than during the baseline cycle, but the greatest increase was approximately 11 percent in both cases. Following a 16 hour soak, no emission rate or fuel consumption was higher during the MUDDS for more than three of the cars. No fuel consumption difference was observed between tests with the baseline and modified highway driving cycles. Emission results from tests using baseline and modified emission test cycles did not show consistent differences.

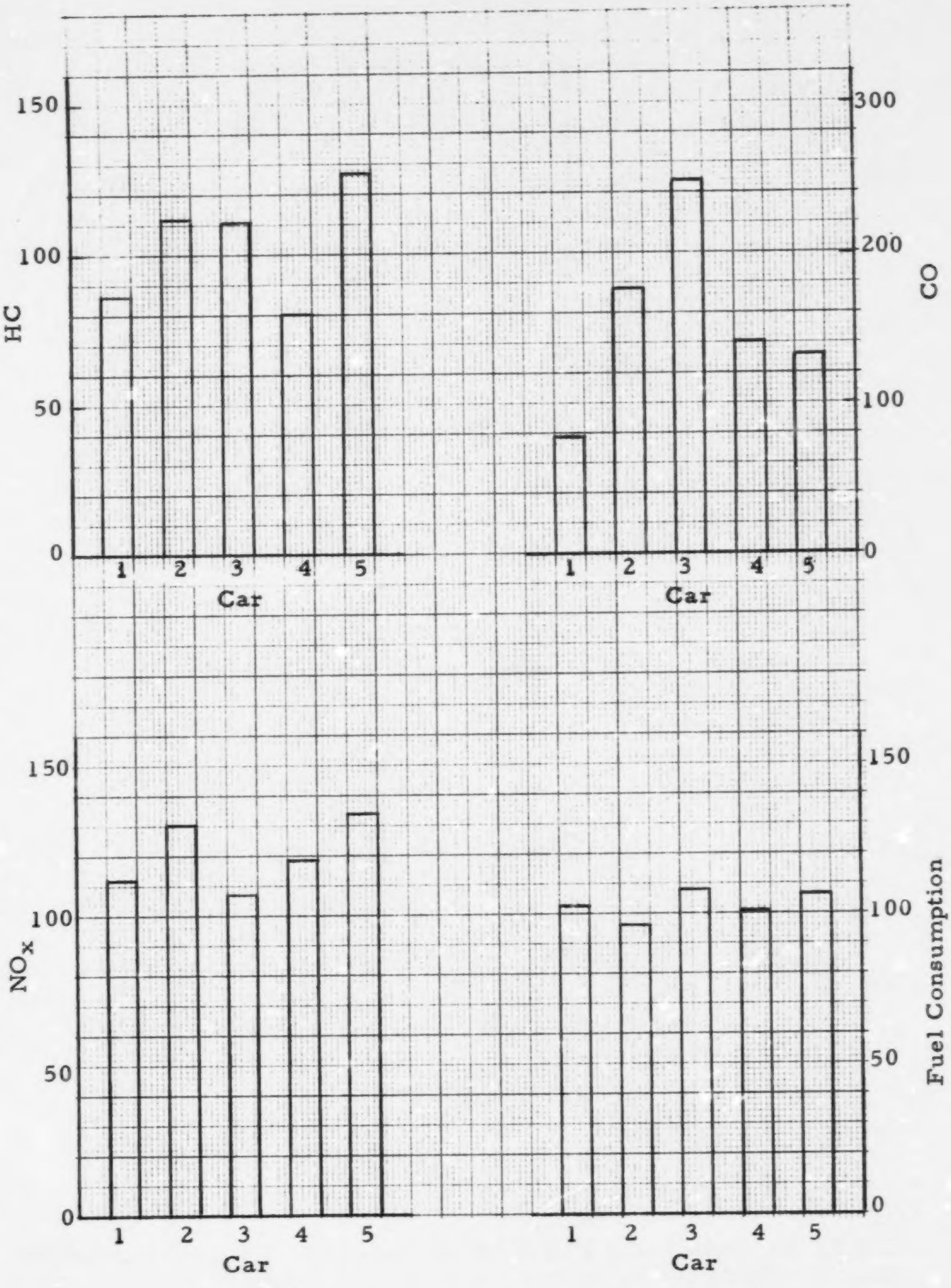


FIGURE 9. AVERAGE EMISSION RATES AND FUEL CONSUMPTION DURING MHFET AS PERCENT OF AVERAGE VALUES DURING HFET

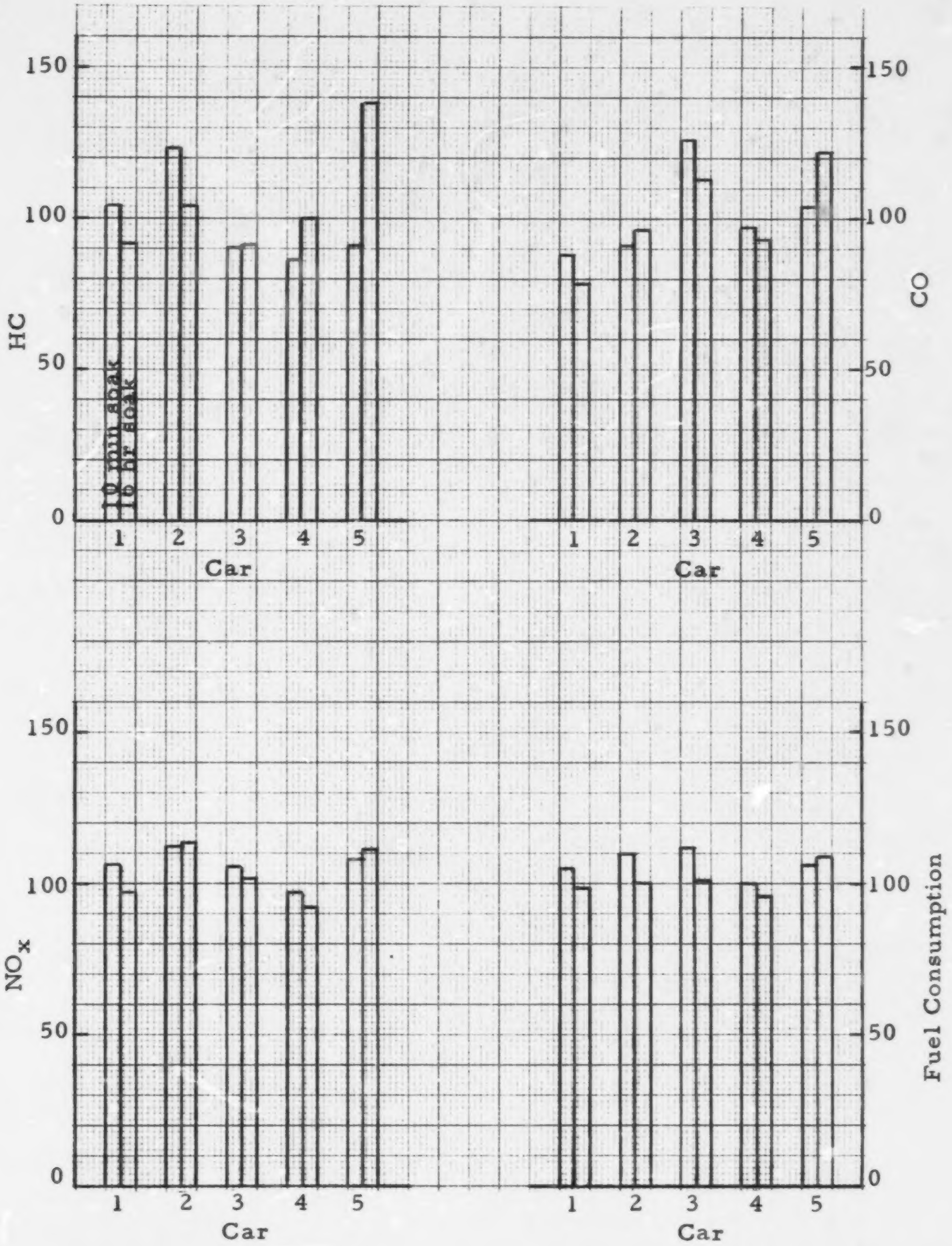


FIGURE 10. AVERAGE EMISSION RATES AND FUEL CONSUMPTION DURING MUDDS AS PERCENT OF AVERAGE VALUES DURING UDDS, 10 MINUTE SOAK AND 16 HOUR SOAK

V. RESULTS

In this section, emission and fuel economy test results are presented for each car individually. The effect of soak period length on emission results and fuel consumption for the UDDS are discussed for each vehicle, and the effect of changing "segment order" is discussed by comparing values obtained with a modified driving cycle to those obtained with the UDDS. The effect of varying the speed vs time characteristics of the HFET are discussed by comparing emission rates and fuel consumption obtained using a modified cycle to that obtained with the HFET. Statistical comparisons of baseline and modified cycles are presented for each vehicle. Because of the large amount of data collected in this project, some test results referred to in the text are summarized in detail in the appendices.

A. Car Number 1 - 1976 Chevrolet Impala

The results with car number 1 are described in terms of various effects, such as the soak period length and cycle modifications in the following subsections.

1. Length of Soak Period

Bar graphs of emission rates and fuel consumption during the UDDS and MUDDS following each length soak period are shown in Figures 11 and 12. In all bar graphs, the bar is the average of two or more tests and the horizontal lines above and below the bar represent actual test values. An exception to this is when three replicates of a test were made, in which case the horizontal lines are the high and low values. In Appendix Table A-2, results of all tests, including emission rates and fuel consumption for each bag sample, are tabulated and averages are calculated for each portion of replicate tests. Table A-1, as do Tables B-1, C-1, D-1, and E-1 for each vehicle, lists numbers corresponding to dynamometer tests at each condition.

As shown in the figures, HC emission rates were approximately equal following soak periods of 10 and 20 minutes, and increased sharply with longer soak periods from 30 minutes to two hours in length. HC was approximately the same following soak periods of two, four, and eight hours, and slightly higher following 16 hour and 36 hour soak periods. There was not a substantial difference between the HC emission rates following 16 hour and 36 hour soak periods. CO emission rates were approximately equal following soak periods of 10 minutes to one hour in length. Following soak periods from two to eight hours long, CO increased sharply with longer soak periods. The CO emission rates following 16 hour and 36 hour soak lengths were much higher than

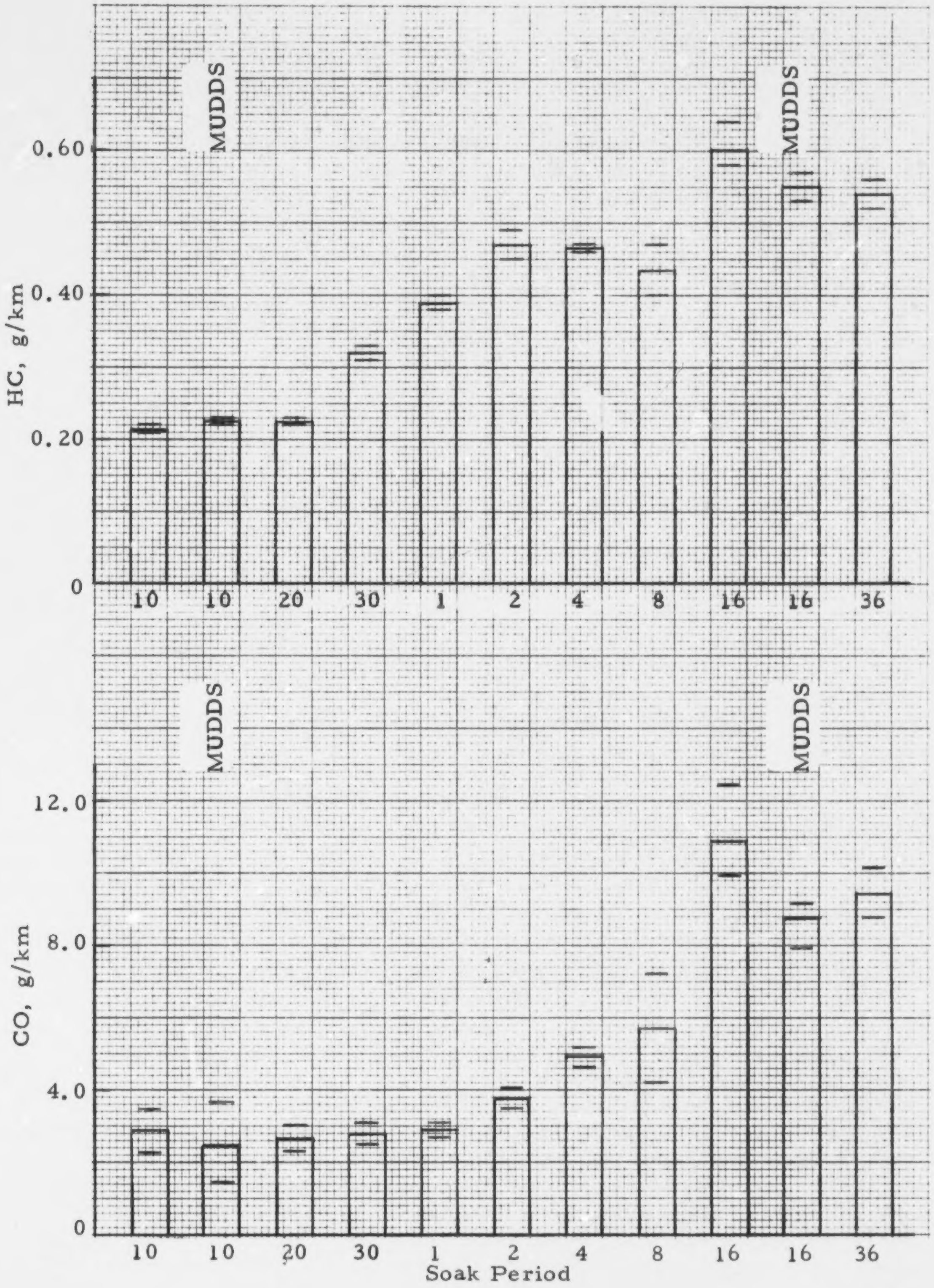


FIGURE 11. COLD START, 23 MINUTE UDDS 2 BAG EMISSION RATES
1976 Chevrolet Impala

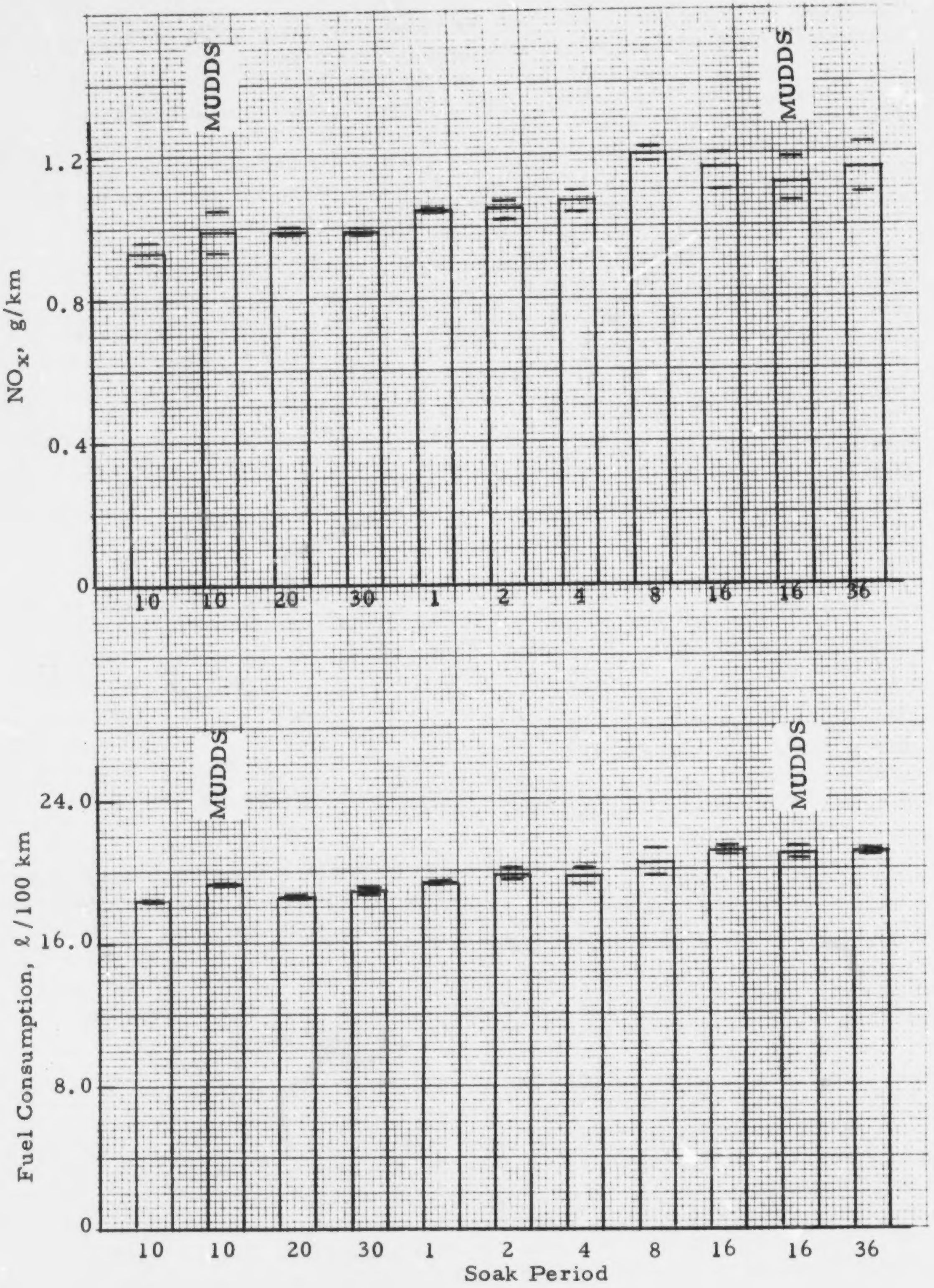


FIGURE 12. COLD START, 23 MINUTE UDDS 2 BAG EMISSION RATES
1976 Chevrolet Impala

following the eight hour soak, but the value following the 36 hour soak was slightly lower than that following the 16 hour soak.

NO_x emission rates and fuel consumption increased gradually following longer soak periods over the entire range of soak periods examined with a few exceptions. NO_x emission rates did not increase with soak period lengths of 8 hours and longer, and fuel consumption did not increase following soak periods of 16 hours and longer.

Emission rates and fuel consumption for the 505 second and 867 second portions of the UDDS following each length soak period are shown in Figures A-1 and A-2 in Appendix A. As shown in the figures, HC emission rates during the first 505 seconds of the cycle increased gradually with longer soak periods in the 10 minute to two hour range, and were approximately equal following soak periods of two to eight hours in length. Following soak periods of 16 and 36 hours, HC in the first 505 seconds was considerably higher, but the 36 hour value was slightly less than the 16 hour value. The HC emission rates in the last 867 seconds of the cycle showed a gradual, but very small, increase with longer soak periods.

CO emission rates in the first 505 seconds of the UDDS were fairly constant following soak periods of 10 minutes to one hour in length. Following soak periods of two to eight hours, CO in this segment increased gradually with longer soak periods. Following soak periods of 16 and 36 hours, CO in this portion of the cycle was substantially higher, but the value following a 36 hour soak was slightly less than that following a 16 hour soak period. During the last 867 seconds of the cycle, CO emission rates were not strongly a function of soak period length, but the overall trend was to increase slightly with longer soak periods.

NO_x emission rates in the first 505 seconds of the UDDS increased slightly with longer soak periods over the entire range of soak periods tested. During the last 867 seconds of the cycle, NO_x emission rates were fairly constant. Although some deviation can be seen, these trends, in general, hold true. Fuel consumption during both portions of the cycle followed a general trend of increasing with longer soak period lengths, with the trend being more noticeable in the first 505 seconds.

2. Comparison of Modified and Baseline Driving Cycles

A "t" test was used to test for a significant difference in emission rates and fuel consumption between modified driving cycles and baseline cycles. The degrees of freedom (ν), t value for a 95 percent confidence interval ($.975^{t_\nu}$), difference between the means of the two samples (d), the standard error of the difference ($S_{\bar{d}}$), and the t value calculated for each case for the Chevrolet Impala are listed in Table 6.

TABLE 6. STATISTICAL "t" TEST COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING BASELINE AND MODIFIED DRIVING CYCLES

1976 Chevrolet Impala

Cycle		ν	$.975t_{\nu}$	d	$S_{\bar{d}}$	t	Significant Difference
HFET vs MHFET	HC	4	2.776	0.01	0.0001	34.64	yes
10 min soak	CO	4	2.776	0.12	0.0216	5.72	yes
	NO_x	4	2.776	0.15	0.1293	1.14	no
	F.C.	4	2.776	0.39	0.0763	5.11	yes
UDDS vs MUDDS	HC	4	2.776	0.05	0.0063	91.08	yes
16 hr soak	CO	4	2.776	2.35	0.8859	2.66	no
	NO_x	4	2.776	0.04	0.0027	13.76	yes
	F.C.	4	2.776	0.16	0.0913	1.72	no
UDDS vs MUDDS	HC	2	4.303	0.01	0.0001	200.00	yes
10 min soak	CO	2	4.303	0.33	1.5297	0.22	no
	NO_x	2	4.303	0.06	0.0045	13.33	yes
	F.C.	2	4.303	0.94	0.0121	77.11	yes

For each case, a significant difference is defined as the calculated t being greater than the t for a 95% confidence interval. In the case of the highway cycles, the test showed significant differences between HC and CO emission rates and fuel consumption. HC and CO were lower in the modified cycle, while fuel consumption was lower in the baseline cycle, as shown in Figure 13. In the figure, the three bars are the actual values from each test, and the horizontal slashed lines are the average of the three values. Actual test values are listed in Appendix A as Table A-3.

For the urban cycles run on the Chevrolet Impala, the "t" test showed significant differences in HC and NO_x emission rates between the two cycles following the 16 hour soak period, with lower values in the modified cycle in both cases. For tests following 10 minute soak periods, a "t" test showed significant differences in HC and NO_x emission rates and fuel consumption between the two cycles; each value being higher for the modified cycle. A graphic comparison of emission rates and fuel consumption during the two cycles can be seen in Figures 11 and 12, where results from the modified driving cycle are plotted alongside baseline results.

3. Repeatability Between Replicate Tests

Table 7 contains emission rate and fuel consumption results from all emission and fuel economy tests and the mean $(\bar{X})$, standard deviation (S_x), and coefficient of variation (C_v) for tests at each condition.

4. Temperature Measurement

The temperature data for the Chevrolet Impala is in Appendix A. Table A-4 lists the maximum, minimum, and average temperatures for each component and the averages for replicate tests. Figure A-3 shows the average temperatures for each component during each length soak period. Also in Appendix A, Figures A-4 and A-5 are bar graphs of average temperatures during transient cycles following specific length soak periods. The related tabulated data is in Table A-5.

5. Sequential Bag Sampling

Emission rates and fuel consumption calculated using the eight sequential bag samples from each test are tabulated in Appendix Tables A-6 through A-16. The total mass of each gas measured during the eight bag sequence was compared to the mass measured with the 505 second bag for that test, and the difference is listed in the respective

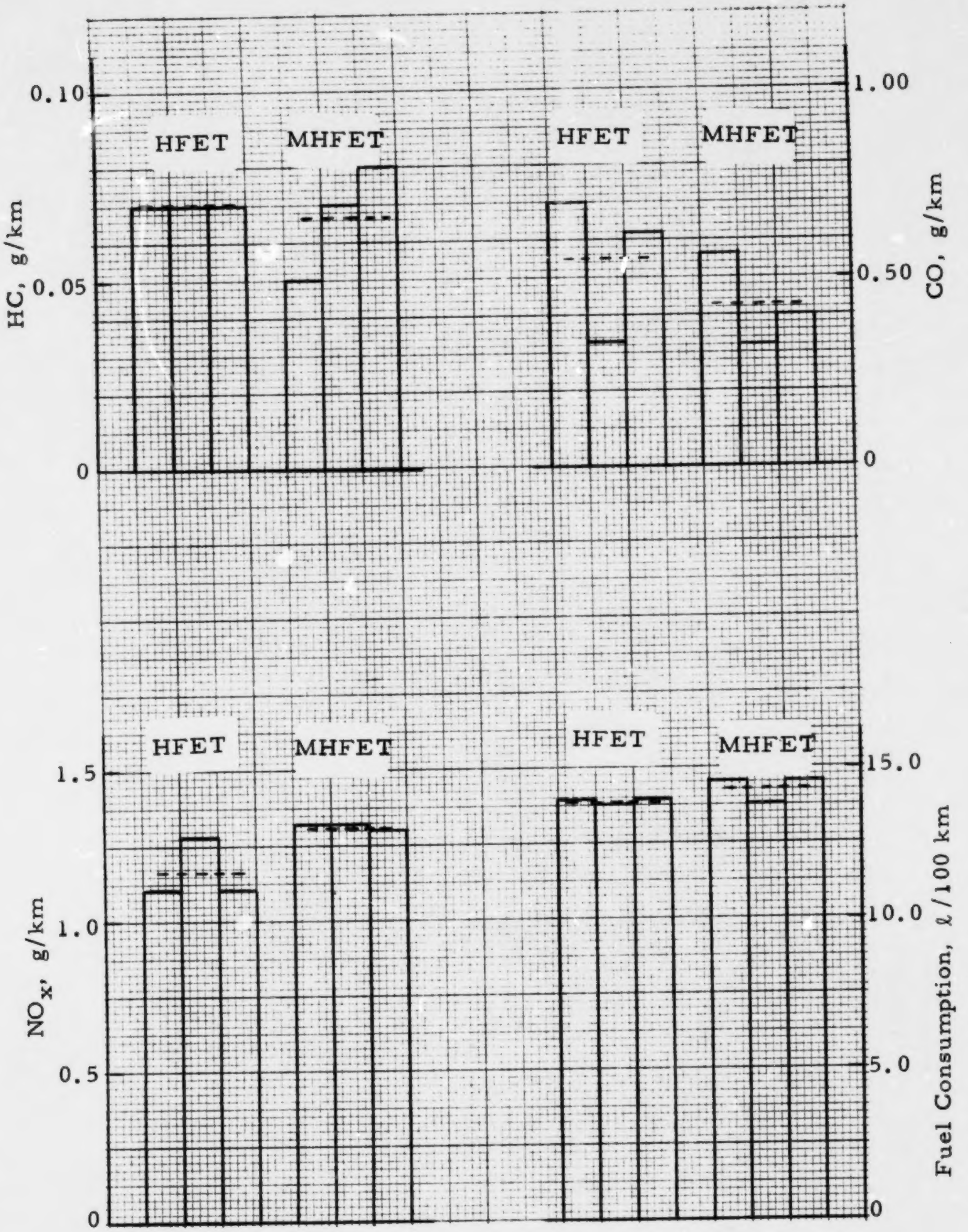


FIGURE 13. COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING HFET AND MHFET
1976 Chevrolet Impala

TABLE 7. MEAN, STANDARD DEVIATION, AND COEFFICIENT OF VARIATION FOR EMISSION RATES AND FUEL CONSUMPTION OF REPLICATE TESTS
1976 Chevrolet Impala

		10 min Soak UDDS	10 min Soak MUDDS	20 min Soak UDDS	30 min Soak UDDS	1 hr Soak UDDS	2 hr Soak UDDS	4 hr Soak UDDS	8 hr Soak UDDS	16 hr Soak UDDS	16 hr Soak MUDDS	36 hr Soak UDDS	HFET	MFET
HC, g/km	1	0.21	0.23	0.20	0.33	0.40	0.49	0.46	0.47	0.64	0.57	0.56	0.07	0.08
	2	0.22	0.22	0.27	0.31	0.38	0.45	0.47	0.40	0.59	0.53	0.52	0.07	0.07
	3									0.58	0.55		0.07	0.05
	$\bar{x}$	0.22	0.23	0.24	0.32	0.39	0.47	0.47	0.44	0.60	0.55	0.54	0.07	0.07
	S_x	0.01	0.01	0.05	0.01	0.01	0.03	0.01	0.05	0.03	0.02	0.03	0.00	0.02
	C_v, %	3.29	3.14	21.06	4.42	3.63	6.02	1.52	11.38	5.33	3.64	5.24	0.00	22.91
CO, g/km	1	2.31	1.46	2.33	3.13	3.06	4.03	5.18	7.20	12.45	9.15	10.15	0.70	0.56
	2	3.46	3.65	3.01	2.52	2.65	3.49	4.64	4.23	10.36	7.92	8.80	0.33	0.32
	3									9.96	8.64		0.62	0.40
	$\bar{x}$	2.89	2.56	2.67	2.83	2.86	3.76	4.91	5.72	10.92	8.57	9.48	0.55	0.43
	Sx	0.81	1.55	0.48	0.43	0.29	0.38	0.38	2.10	1.34	0.62	0.95	0.19	0.12
	C_v, %	28.19	60.61	18.01	15.27	10.15	10.16	7.78	36.75	12.24	7.21	10.07	35.40	28.64
NO_x, g/km	1	0.90	1.05	1.00	1.00	1.04	1.02	1.04	1.22	1.10	1.19	1.09	1.11	1.32
	2	0.96	0.93	0.98	0.98	1.05	1.05	1.10	1.18	1.20	1.11	1.23	1.28	1.32
	3									1.18	1.07		1.11	1.30
	$\bar{x}$	0.93	0.99	0.99	0.99	1.05	1.04	1.07	1.20	1.16	1.12	1.16	1.17	1.31
	Sx	0.04	0.08	0.01	0.01	0.01	0.02	0.04	0.03	0.05	0.06	0.10	0.10	0.01
	C_v, %	4.56	8.57	1.43	1.43	0.68	2.05	3.97	2.36	4.56	5.44	8.53	8.41	0.88
Fuel Cons., ℓ/100 km	1	18.44	19.39	18.45	19.08	19.25	20.11	20.12	21.25	20.91	21.32	20.71	13.93	14.52
	2	18.30	19.22	18.63	18.77	19.46	19.49	19.53	19.70	20.84	20.69	21.07	13.76	13.79
	3									21.31	20.58		13.96	14.51
	$\bar{x}$	18.37	19.31	18.54	18.93	19.36	19.80	19.83	20.48	21.02	20.86	20.89	13.88	14.27
	Sx	0.10	0.12	0.13	0.22	0.15	0.44	0.42	1.10	0.25	0.40	0.25	0.11	0.42
	C_v, %	0.54	0.62	0.69	1.16	0.77	2.21	2.10	5.35	1.21	1.91	1.22	0.78	2.93

tables of sequential results in Appendix A. The agreement with the 505 second bag was generally within 5%. Bar graphs of the eight bag sequences for each test condition, and bar graphs comparing the eight bag sequences of the UDDS and MUDDS are also in Appendix A as Figures A-6 through A-18.

B. Car Number 2 - 1977 Ford LTD

The following describes the major findings with Car No. 2

1. Length of Soak Period

Bar graphs of emission rates and fuel consumption during the UDDS and MUDDS are shown in Figures 14 and 15. In Appendix B results of all tests, including emission rates and fuel consumption for each bag sample, are tabulated and averages are listed for each portion of replicate tests in Table B-2.

As can be seen in the figures, HC emission rates increased gradually with increases in soak period length of up to 2 hours, but no definite trend in HC emissions can be seen in tests following soak periods of 4 to 16 hours in length. The HC values following a 36 hour soak period, however, are substantially higher than those following a 16 hour soak. CO emission rates remained fairly stable following soak periods of up to four hours. Following soak periods of 8 to 36 hours in length, CO increased sharply with increases in soak period length.

NO_x emission rates did not follow any particular trend with changes in soak period length. Although variation was noticeable in NO_x rates following different length soak periods, the variation is random and on an absolute scale is fairly small. Fuel consumption following soak periods of 20 minutes to 4 hours in length was approximately constant. Following the 10 minute soak period, fuel consumption was slightly lower, and following 8 hour and longer soak periods was fairly constant and slightly higher than values measured following soak periods in the 20 minutes to 4 hour range.

Emission rates and fuel consumption for the first 505 seconds and the last 867 seconds of the UDDS following each length soak period are shown in Figures B-1 and B-2 in Appendix B. HC emission rates during the first 505 seconds of the cycle were strongly related to soak period length, increasing sharply with increasing soak period length in the range of 10 to 30 minutes and generally increasing slightly with longer soak periods in the range of 1 to 16 hours. The HC emission rate in this interval was much higher following a 36 hour soak period than following a 16 hour soak. HC emission rates in the last 867 seconds of the cycle were fairly constant over the range of soak periods tested.

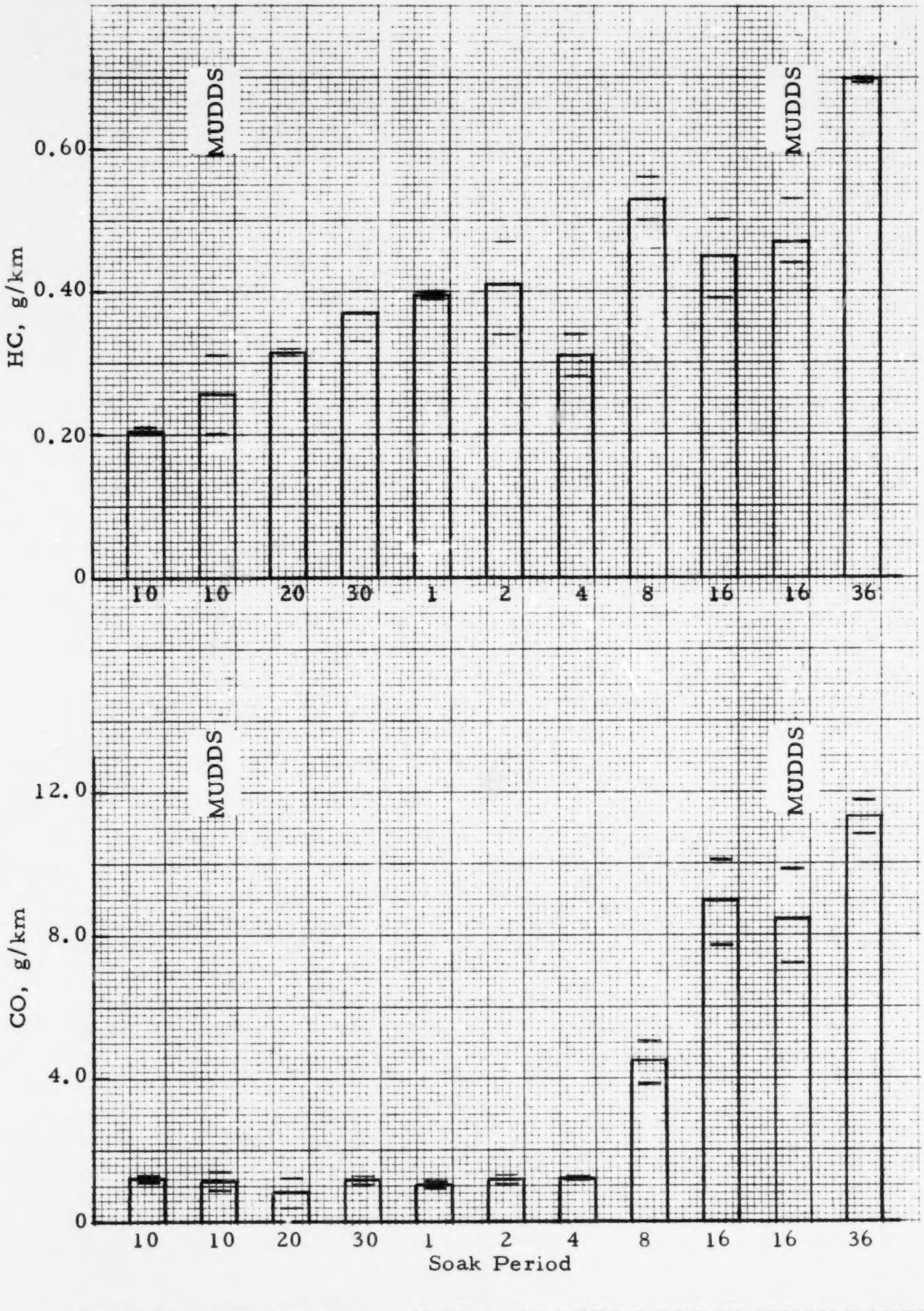


FIGURE 14. COLD START, 23 MINUTE UDDS 2 BAG EMISSION RATES
1977 Ford LTD

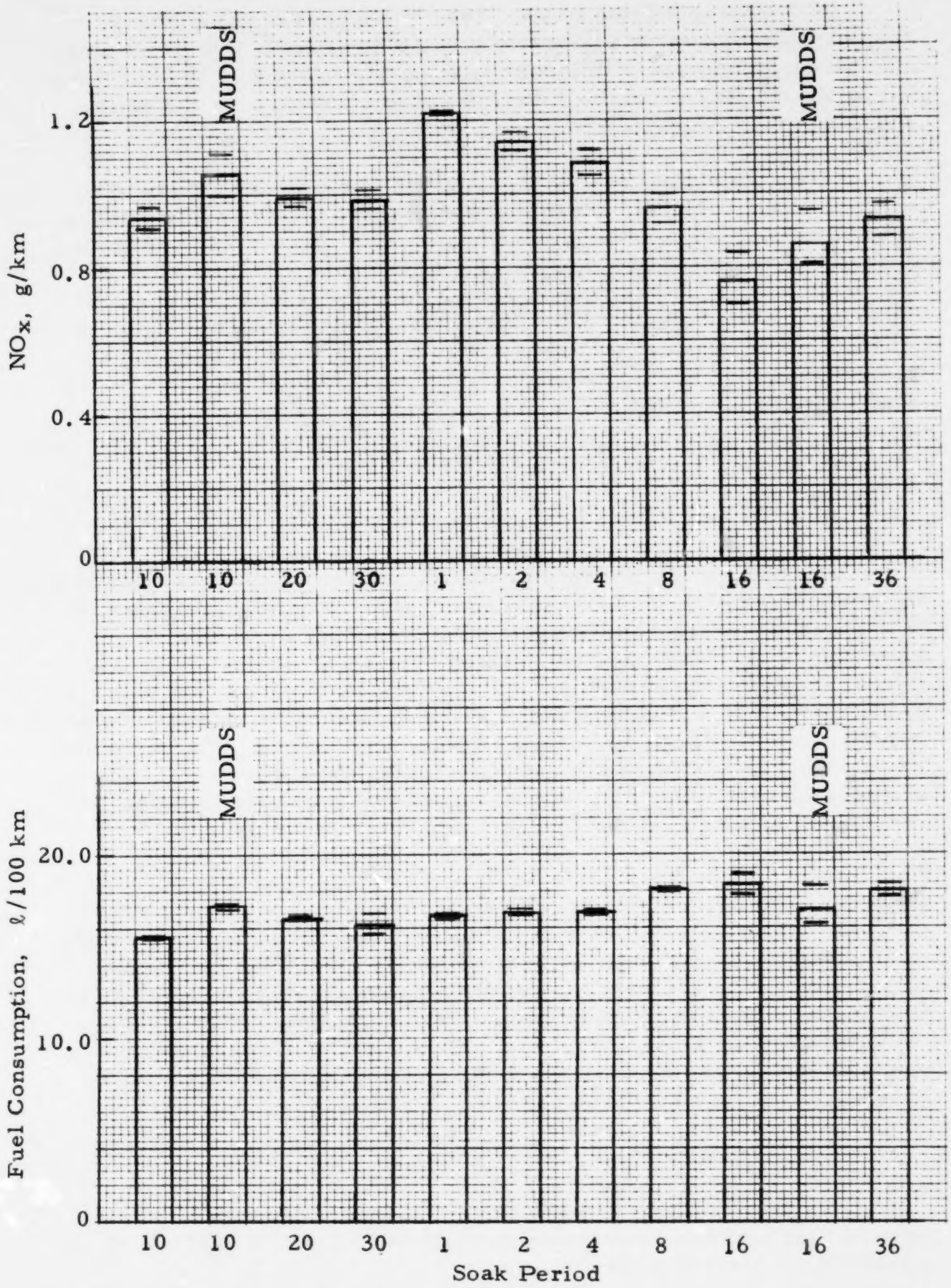


FIGURE 15. COLD START, 23 MINUTE UDDS 2 BAG EMISSION RATES
1977 Ford LTD

CO emission rates in the first 505 seconds of the UDDS were very constant following soak periods of 10 minutes to 4 hours in length but increased sharply with longer soak period in the 8 to 36 hour range. CO in the last 867 seconds of the cycle was constant over the entire range of soak periods tested.

NO_x emission rates in the first 505 seconds and the last 867 seconds of the UDDS did not follow a particular pattern with variations in soak period length. Variation is noticeable between tests following different soak period lengths, but the variation is small relative to the actual values. Fuel consumption in the first 505 seconds of the cycle was nearly constant following soak periods from 20 minutes to 4 hours in length but was slightly lower following a 10 minute soak and considerably higher following 8 hour and longer soak periods. Fuel consumption in the last 867 seconds of the UDDS was fairly constant following soak periods of 20 minutes and longer, but was considerably lower following a 10 minute soak.

2. Comparison of Baseline and Modified Driving Cycles

A summary of the statistical comparisons of the baseline and modified driving cycles are shown in Table 8. For the highway cycles, a "t" test showed significant differences between HC, CO, and NO_x emission rates. Average values for the modified cycle were higher in each case, as shown in Figure 16. Although the figure appears to show considerable variability in CO emission rates, the differences between replicate tests are small on an absolute scale. For the modified cycle, which has the greater variability, the corrected sample concentrations for the high and low values differ by only 18 ppm. Actual test results are listed in Appendix B as Table B-3.

In the case of the urban cycles, a "t" test showed significant differences in HC and NO_x emission rates following the 16 hour soak periods, with higher values in the modified cycle in both cases. For tests following 10 minute soak periods, a "t" test indicated a significant difference in HC and NO_x emission rates and in fuel consumption, with higher values in the modified cycle in each case. A graphic comparison of the urban cycles can also be seen in Figures 14 and 15, where results from the modified driving cycle are plotted alongside baseline cycle results.

3. Repeatability Between Replicate Tests

Table 9 contains emission rate and fuel consumption results from all tests and the mean, standard deviation, and coefficient of variation for tests at each condition.

TABLE 8. STATISTICAL "t" TEST COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING BASELINE AND MODIFIED DRIVING CYCLES
1977 Ford LTD

Cycle		ν	$.975^{t}\nu$	d	$S_{\bar{d}}$	t	Significant Difference
HFET vs MHFET	HC	4	2.776	0.01	0.0001	123.09	yes
10 min soak	CO	4	2.776	0.06	0.0027	22.38	yes
	NO_x	4	2.776	0.21	0.0041	52.07	yes
	F.C.	4	2.776	0.46	0.0235	1.94	no
UDDS vs MUDDS	HC	4	2.776	0.03	0.0022	13.46	yes
16 hr soak	CO	4	2.776	0.30	1.3541	0.22	no
	NO_x	4	2.776	0.10	0.0046	21.68	yes
	F.C.	4	2.776	0.11	0.2101	0.51	no
UDDS vs MUDDS	HC	2	4.303	0.05	0.0030	16.39	yes
10 min soak	CO	2	4.303	0.11	0.0618	1.70	no
	NO_x	2	4.303	0.12	0.0039	29.30	yes
	F.C.	2	4.303	1.57	0.0538	29.18	yes

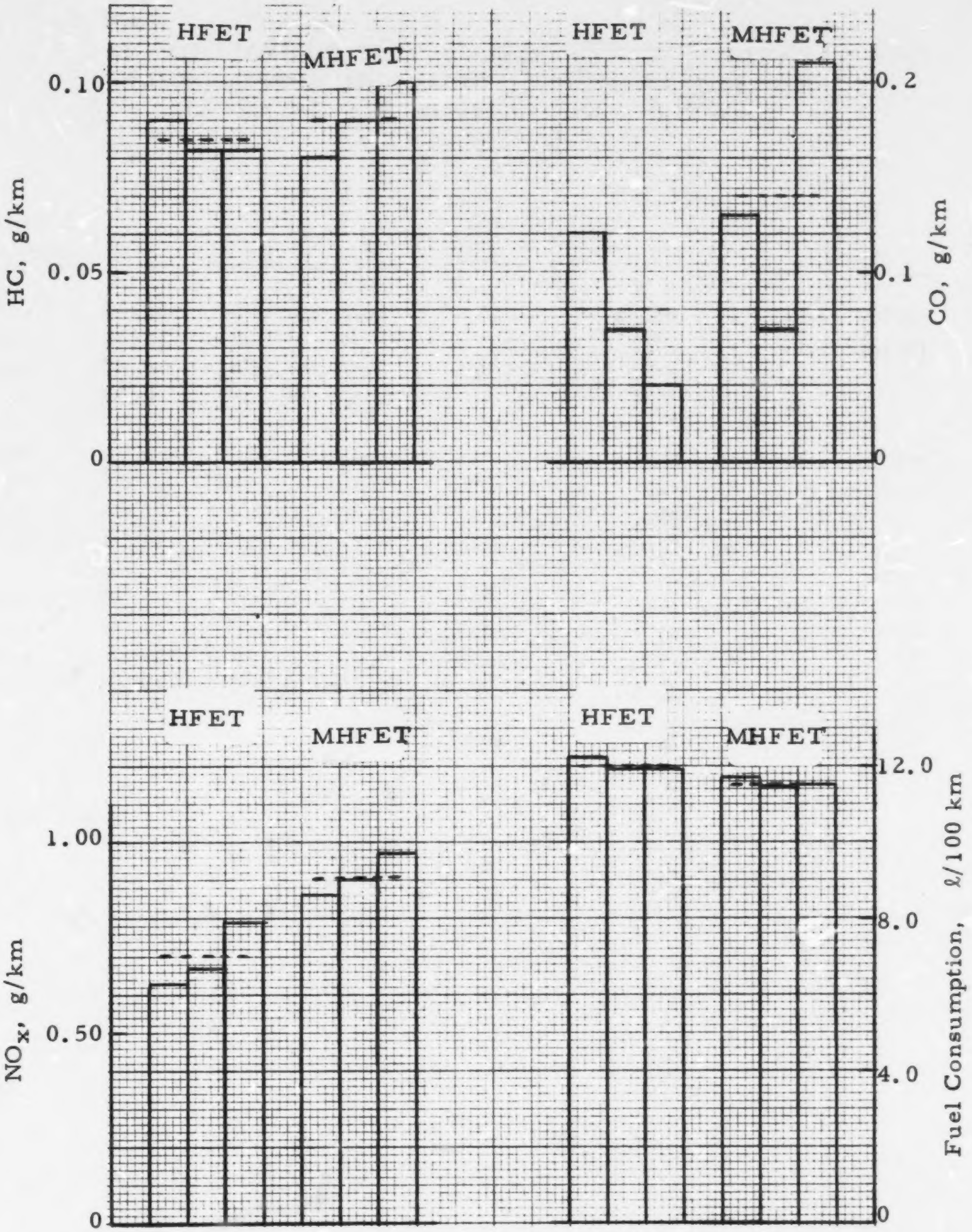


FIGURE 16. COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING HFET AND MHFET
1977 Ford LTD

TABLE 9. MEAN, STANDARD DEVIATION, AND COEFFICIENT OF VARIATION FOR EMISSION RATES AND FUEL CONSUMPTION OF REPLICATE TESTS

1977 Ford LTD

		10 min Soak UDDS	10 min Soak MUDDS	20 min Soak UDDS	30 min Soak UDDS	1 hr Soak UDDS	2 hr Soak UDDS	4 hr Soak UDDS	8 hr Soak UDDS	16 hr Soak UDDS	16 hr Soak MUDDS	36 hr Soak UDDS	HFET	MHFET
HC, g/km	1	0.20	0.20	0.32	0.40	0.40	0.47	0.34	0.56	0.39	0.44	0.70	0.09	0.08
	2	0.21	0.31	0.31	0.33	0.39	0.34	0.28	0.50	0.50	0.53	0.70	0.08	0.09
	3									0.45	0.45		0.08	0.10
	$\bar{x}$	0.21	0.26	0.32	0.37	0.40	0.41	0.31	0.53	0.45	0.47	0.70	0.08	0.09
	S_x	0.01	0.08	0.01	0.05	0.01	0.09	0.04	0.04	0.06	0.05	0.00	0.01	0.01
	C_v, %	3.45	30.50	2.24	13.56	1.79	22.70	13.69	8.00	12.33	10.42	0.00	6.93	11.11
CO, g/km	1	1.31	1.38	0.40	1.04	0.98	1.05	1.23	5.07	8.51	8.23	10.81	0.12	0.13
	2	1.18	0.90	1.24	1.33	1.08	1.31	1.22	3.87	10.14	9.85	11.76	0.07	0.07
	3									7.70	7.21		0.04	0.21
	$\bar{x}$	1.25	1.14	0.82	1.19	1.03	1.18	1.23	4.47	8.78	8.43	11.29	0.08	0.14
	S_x	0.09	0.34	0.59	0.21	0.07	0.18	0.01	0.85	1.24	1.33	0.67	0.04	0.07
	C_v, %	7.38	29.77	72.44	17.30	6.87	15.58	0.58	18.98	14.15	15.79	5.95	52.71	51.39
NO_x, g/km	1	0.97	1.00	1.02	1.01	1.22	1.17	1.05	0.92	0.70	0.82	0.88	0.63	0.86
	2	0.91	1.11	0.97	0.96	1.22	1.12	1.12	1.00	0.74	0.81	0.97	0.67	0.90
	3									0.84	0.95		0.79	0.97
	$\bar{x}$	0.94	1.06	1.00	0.99	1.22	1.15	1.07	0.96	0.76	0.86	0.93	0.70	0.91
	S_x	0.04	0.08	0.04	0.04	0.00	0.04	0.05	0.06	0.07	0.08	0.06	0.08	0.06
	C_v, %	4.51	7.37	3.55	3.59	0.00	3.09	4.56	5.89	9.49	9.08	6.88	11.95	6.12
Fuel Cons., ℓ/100 km	1	15.59	17.36	16.76	16.86	16.74	17.03	16.69	18.29	18.87	18.15	17.68	12.25	11.70
	2	15.53	16.90	16.47	15.73	16.66	16.70	16.90	18.27	18.50	19.01	18.37	11.90	11.47
	3									17.81	18.34		11.89	11.50
	$\bar{x}$	15.56	17.13	16.62	16.30	16.70	16.87	16.80	18.28	18.39	18.50	18.03	12.01	11.56
	S_x	0.04	0.33	0.21	0.80	0.06	0.23	0.15	0.01	0.54	0.45	0.49	0.21	0.13
	C_v, %	0.27	1.90	1.23	4.90	0.34	1.38	0.88	0.08	2.92	2.44	2.71	1.71	1.08

4. Temperature Measurement

In Appendix B, the maximum, minimum, and average for each temperature are tabulated and the averages for replicate tests are listed in Table B-4. Figure B-3 shows the average temperatures during each length soak period. Also in Appendix B as Figures B-4 and B-5 are bar graphs of average temperatures during transient cycles following specific length soak periods, and the related data is listed in Table B-5 in Appendix B.

As requested by the Task Officer in a telephone conversation of February 9, 1977, when emission tests following different length soak periods were run on the same day (using the preceding test as preconditioning) the tests following shorter soak periods were run first. This sequence is reversed from that used in testing other vehicles in this project, where the longer soak period tests were run first. Possibly as a result of this reversed sequence, fuel tank temperatures were lower during the 10 minute soak periods and following tests than in the 20 minute soak periods and following tests. This relationship is also apparent between the 20 and 30 minute soak periods and tests. This pattern is the reverse of that seen on the other vehicles tested in this project, which were all tested with the sequence listed in Table 2.

5. Sequential Bag Sampling

The emission rates and fuel consumption calculated using the eight bag samples are tabulated in Appendix B in Tables B-6 through B-16. The total mass of each gas measured during each eight bag sequence was compared with the mass measured with the 505 second sample bag, and the agreement was generally within five percent. The actual figures for each test are listed in the tables of the respective tests in Appendix B. Also in the appendix, as Figures B-6 through B-18 are bar graphs of the eight bag sequences of the UDDS and MUDDS.

C. Car Number 3 - 1976 Plymouth Fury

Following are the results of tests investigating soak length effects and tests to compare results with modified and baseline driving cycles.

1. Length of Soak Period

Emission rates and fuel consumption during the UDDS and MUDDS are shown in bar graphs in Figures 17 and 18. In Appendix C, in Table C-2, results of all tests, as well as emission rates and fuel consumption for each bag sample, are tabulated and averages are calculated for each portion of replicate tests.

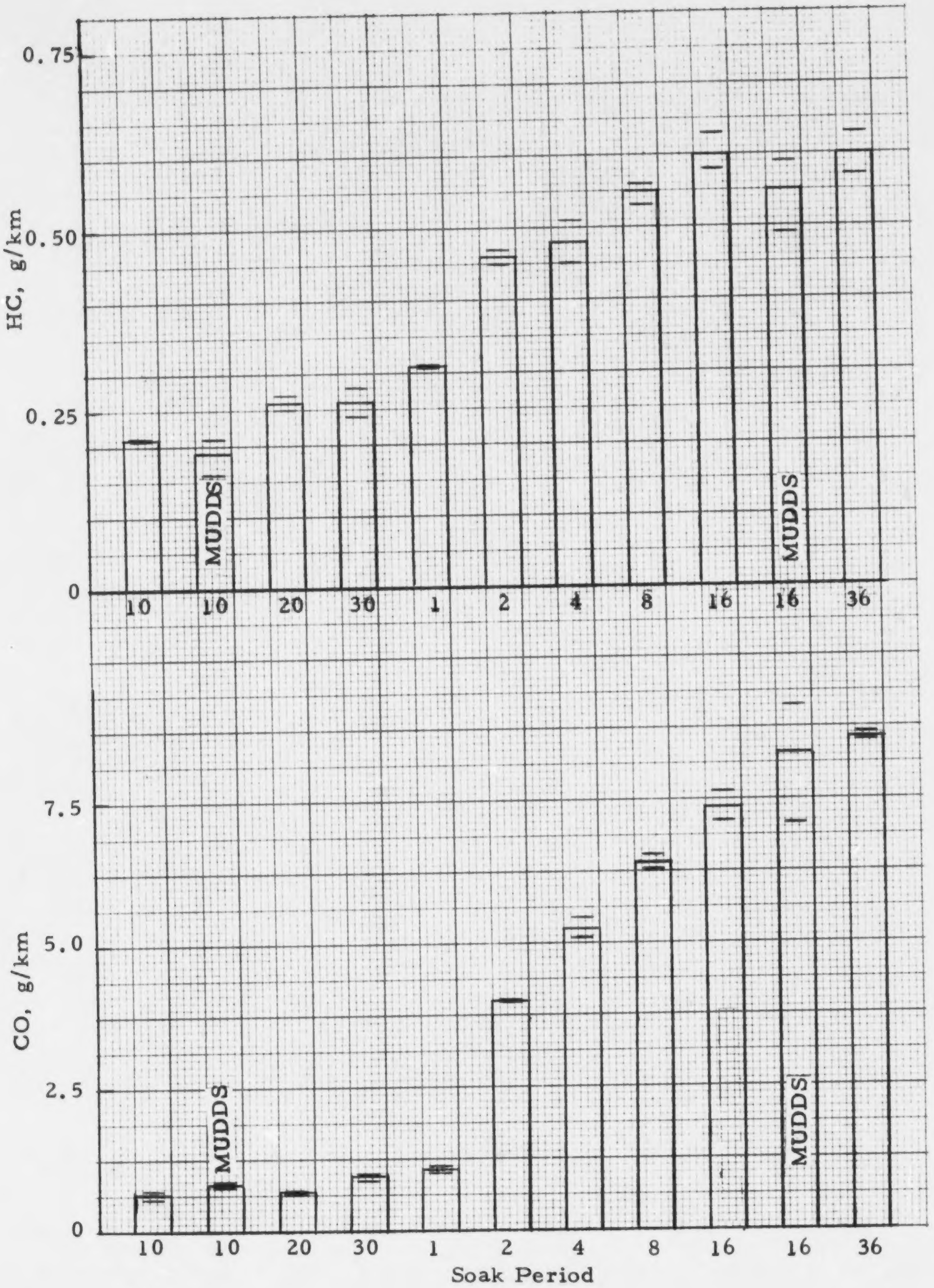


FIGURE 17. COLD START, 23 MINUTE UDDS - 2 BAG EMISSION RATES
1976 Plymouth Fury

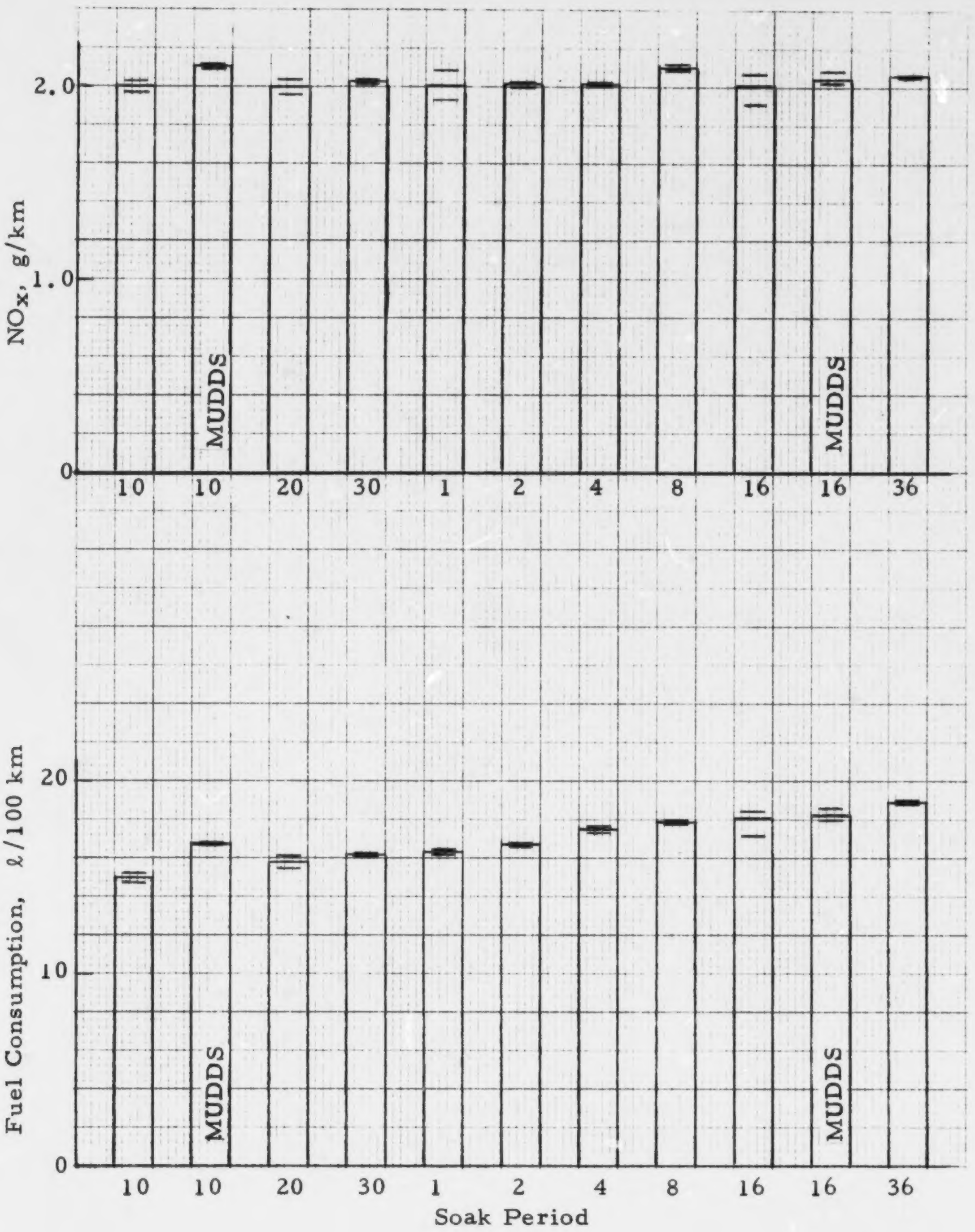


FIGURE 18. COLD START, 23 MINUTE UDDS - 2 BAG EMISSION RATES
1976 Plymouth Fury

As shown in Figures 17 and 18, slightly lower HC and substantially lower CO emission rates were measured following soak lengths of one hour and less. Although there was some detectable variation between HC values following one hour and shorter soak periods and between CO values following one hour and shorter soak periods, the amounts of variation were small relative to the average values. HC emission rates increased slightly with soak period lengths of two to sixteen hours, but there was not a measurable difference between values following sixteen and thirty-six hour soak periods. CO emission rates increased gradually with soak lengths from two to thirty-six hours.

NO_x emission rates were not notably affected by variation in soak length over the range tested. Although some variation was detectable between tests following different length soak periods, this variation was no larger than the variation between replicate tests. Fuel consumption decreased very slightly with shorter soak lengths over the entire range of soak periods tested.

Emission rates and fuel consumption for the first 505 seconds and the last 867 seconds of the UDDS following each length soak period are shown in Figures C-1 and C-2 in Appendix C. HC emission rates for the first 505 seconds of the cycle decreased gradually with shorter soak lengths of one hour and less. The HC values for this interval following two hour and longer soak periods were notably higher than those following shorter soak periods, and increased gradually with longer soak periods. HC emission rates in the last 867 seconds of the UDDS were not clearly affected by variation in soak period length.

CO emission rates during the first 505 seconds of the UDDS increased very slightly with longer soak lengths in the 10 minute to one hour range, and were substantially higher and increased sharply with longer soak periods in the two to thirty-six hour range. CO emission rates in the last 867 seconds of the UDDS following soak periods of one hour and shorter were not notably affected by soak period length, but increased gradually with the longer soak periods of from two to thirty-six hours in length.

NO_x emission rates in the first 505 seconds of the UDDS were not noticeably affected by soak lengths of two hours and less, but were slightly lower following soak periods of four hours and longer. NO_x emission rates during the last 867 seconds of the UDDS were fairly constant following soak lengths of two hours and less, but were slightly higher following soak periods of four hours and longer. Fuel consumption during both portions of the UDDS increased slightly with increased soak length over the entire range of soak lengths tested, with the increase in the last 867 seconds being very gradual and the increase in the first 505 seconds being gradual, but more noticeable than in the last 867 seconds.

2. Comparison of Baseline and Modified Driving Cycles

Details of the statistical comparisons of emission rates and fuel consumption during baseline and modified driving cycles are shown in Table 10. For the highway cycles, the "t" showed significant differences between HC, CO, and NO_x emission rates and fuel consumption during the two cycles. Average values for the modified cycle were higher in each case, as can be seen in Figure 19. Emission and fuel consumption values from tests using non urban cycles are listed in Table C-3 in Appendix C.

In the case of the urban cycles, a "t" test showed significant differences in HC and NO_x emission rates between the two cycles following 16 hour soak periods, with lower HC and higher NO_x in the modified cycle. A "t" test showed significant differences between HC, CO and NO_x emission rates and fuel consumption between the two cycles following the 10 minute soak period, with lower HC, higher CO, NO_x and fuel consumption in the modified cycle. A graphic comparison of the urban cycles can be seen in Figures 17 and 18, where results from the modified driving cycle are plotted alongside the baseline results.

3. Repeatability Between Replicate Tests

Table 11 contains the emission rate and fuel consumption results from all tests and the mean, standard deviation, and coefficient of variation for tests at each condition.

4. Temperature Measurement

In Appendix C, the maximum, minimum, and average temperatures for each component are tabulated, and average temperatures are listed for replicate tests in Table C-4. Figure C-3 shows the average temperatures during each length soak period for the Plymouth Fury. Bar graphs of average temperatures during transient cycles are included in Appendix C as Figures C-4 and C-5, and the related tabulated data is in Table C-5.

5. Sequential Bag Sampling

Emission rates and fuel consumption calculated from the eight sequential CVS bag samples from the Plymouth Fury are listed in Tables C-6 through C-16 in Appendix C. Generally, the masses measured by the two procedures agreed within five percent. Also in Appendix C,

TABLE 10. STATISTICAL "t" TEST COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING BASE LINE AND MODIFIED DRIVING CYCLES

1976 Plymouth Fury

Cycle		ν	$._{975}t_{\nu}$	d	$S_{\bar{d}}$	t	Significant Difference
HFET vs MHFET 10 min soak	HC	4	2.776	0.01	0.0001	100.00	yes
	CO	4	2.776	0.32	0.0032	61.53	yes
	NO_x	4	2.776	0.16	0.0088	18.18	yes
	F.C.	4	2.776	0.92	0.0293	30.96	yes
UDDS vs MUDDS 16 hr soak	HC	4	2.776	0.05	0.0014	36.74	yes
	CO	4	2.776	0.95	0.5042	1.88	no
	NO_x	4	2.776	0.02	0.0042	5.55	yes
	F.C.	4	2.776	0.26	0.1237	2.10	no
UDDS vs MUDDS 10 min soak	HC	2	4.303	0.03	0.0006	40.00	yes
	CO	2	4.303	0.18	0.0088	19.83	yes
	NO_x	2	4.303	0.11	0.0011	93.33	yes
	F.C.	2	4.303	1.82	0.0565	32.24	yes

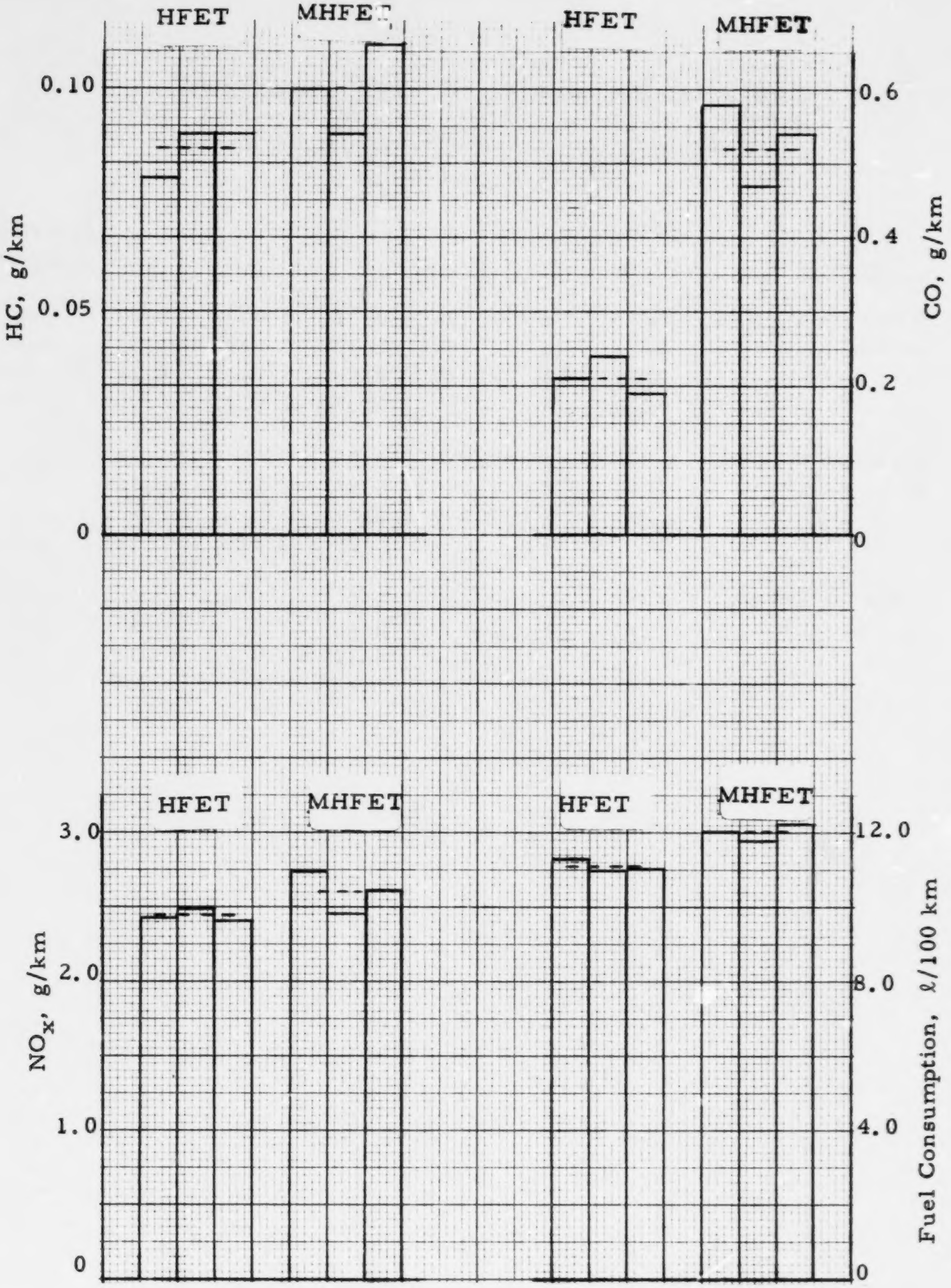


FIGURE 19. COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING HFET AND MHFET
1976 Plymouth Fury

TABLE 11. MEAN, STANDARD DEVIATION, AND COEFFICIENT OF VARIATION FOR EMISSION RATES AND FUEL CONSUMPTION OF REPLICATE TESTS

1976 Plymouth Fury

		10 min Soak UDDS	10 min Soak MUDDS	20 min Soak UDDS	30 min Soak UDDS	1 hr Soak UDDS	2 hr Soak UDDS	4 hr Soak UDDS	8 hr Soak UDDS	16 hr Soak UDDS	16 hr Soak MUDDS	36 hr Soak UDDS	HFET	MHFET
HC, g/km	1	0.21	0.21	0.27	0.24	0.31	0.47	0.51	0.53	0.59	0.59	0.63	0.08	0.10
	2	0.21	0.16	0.25	0.28	0.31	0.45	0.45	0.56	0.58	0.56	0.57	0.09	0.09
	3									0.63	0.49		0.09	0.11
	$\overline{x}$	0.21	0.19	0.26	0.26	0.31	0.46	0.48	0.55	0.60	0.55	0.60	0.09	0.10
	S_x	0.00	0.04	0.01	0.03	0.00	0.01	0.04	0.02	0.03	0.05	0.04	0.01	0.01
	C_v, %	0.00	21.05	5.44	10.88	0.00	3.07	8.84	3.89	5.00	9.09	7.07	11.11	10.00
CO, g/km	1	0.55	0.85	0.69	0.87	1.13	3.95	5.43	6.55	7.64	7.09	8.50	0.21	0.58
	2	0.72	0.77	0.70	0.99	1.01	4.07	5.09	6.33	7.11	9.13	8.66	0.24	0.47
	3									7.34	8.72		0.19	0.54
	$\overline{x}$	0.64	0.81	0.70	0.93	1.07	4.01	5.26	6.44	7.36	8.31	8.58	0.21	0.53
	S_x	0.12	0.06	0.01	0.08	0.08	0.08	0.24	0.16	0.27	1.08	0.11	0.03	0.06
	C_v, %	18.93	7.41	1.02	9.12	7.93	2.12	4.57	2.42	3.67	13.00	1.32	14.29	11.32
NO_x, g/km	1	2.03	2.12	2.04	2.03	2.09	1.99	2.07	2.01	1.91	2.09	2.06	2.43	2.74
	2	1.97	2.09	1.96	2.02	1.93	2.08	2.00	2.20	2.06	2.00	2.05	2.49	2.46
	3									2.07	2.02		2.41	2.62
	$\overline{x}$	2.00	2.11	2.00	2.03	2.01	2.04	2.04	2.11	2.01	2.04	2.06	2.44	2.61
	S_x	0.04	0.02	0.06	0.01	0.11	0.06	0.05	0.13	0.09	0.05	0.01	0.04	0.14
	C_v, %	2.12	0.95	2.83	0.35	5.63	3.13	2.43	6.38	4.48	2.45	0.34	1.64	5.36
Fuel Cons., ℓ/100 km	1	15.20	16.75	16.16	16.14	16.50	16.66	17.74	17.91	17.56	18.61	18.87	11.26	12.04
	2	14.73	16.82	15.53	16.25	16.17	16.79	17.32	17.97	18.02	18.20	18.84	10.98	11.78
	3									18.48	18.02		11.04	12.23
	$\overline{x}$	14.97	16.79	15.85	16.20	16.34	16.73	17.53	17.94	18.02	18.28	18.86	11.09	12.02
	S_x	0.33	0.05	0.45	0.08	0.23	0.09	0.30	0.04	0.46	0.30	0.02	0.15	0.23
	C_v, %	2.22	0.30	2.81	0.48	1.43	0.55	1.69	0.24	2.55	1.64	0.11	1.35	1.91

bar graphs of the eight bag sequences for each test condition, and bar graphs comparing the eight bag sequences of the UDDS and MUDDS are presented as Figures C-6 through C-18.

D. Car Number 4 - 1976 Chevrolet Vega

Following are the results of emission and fuel economy tests using the 1976 Chevrolet Vega.

1. Length of Soak Period

Bar graphs of emission rates and fuel consumption during the UDDS and MUDDS are shown in Figures 20 and 21. In Appendix D, results of all tests, including emission rates and fuel consumption for each bag sample, are tabulated and averages are listed for each portion of replicate tests in Table D-2.

As can be seen in the Figures 20 and 21, HC emission rates increased gradually with increases in soak period length of up to 16 hours, but there was not a substantial difference between HC emission rates following 16 hour and 36 hour soak periods. Although there was some variation noticeable, the dominant trend was a gradual increase with increasing soak period length. CO emission rates were approximately equal for soak periods of 20 minutes to one hour, but were slightly lower following a 10 minute soak. Following soak periods from two hours to eight hours in length, the CO emission rates increased sharply with longer soak periods. The CO following the 16 hour soak period was approximately equal to that following the eight hour soak, and following the 36 hour soak period the CO emission rate was substantially higher than following the eight and 16 hour soak periods.

NO_x emission rates and fuel consumption increased slightly with longer soak period length over the range tested with a few exceptions. NO_x and fuel consumption following the 10 minute soak period were slightly higher than following the 20 minute period. Fuel consumption was not notably higher following the 36 hour soak period than following the 16 hour soak period.

Emission rates and fuel consumption for the first 505 seconds and the last 867 seconds of the UDDS following each length soak period are shown in Figures D-1 and D-2 in Appendix D. HC emission rates during the first 505 seconds of the cycle were strongly related to soak period length, increasing sharply following longer soak periods over the entire range of soak periods examined. One exception to this trend

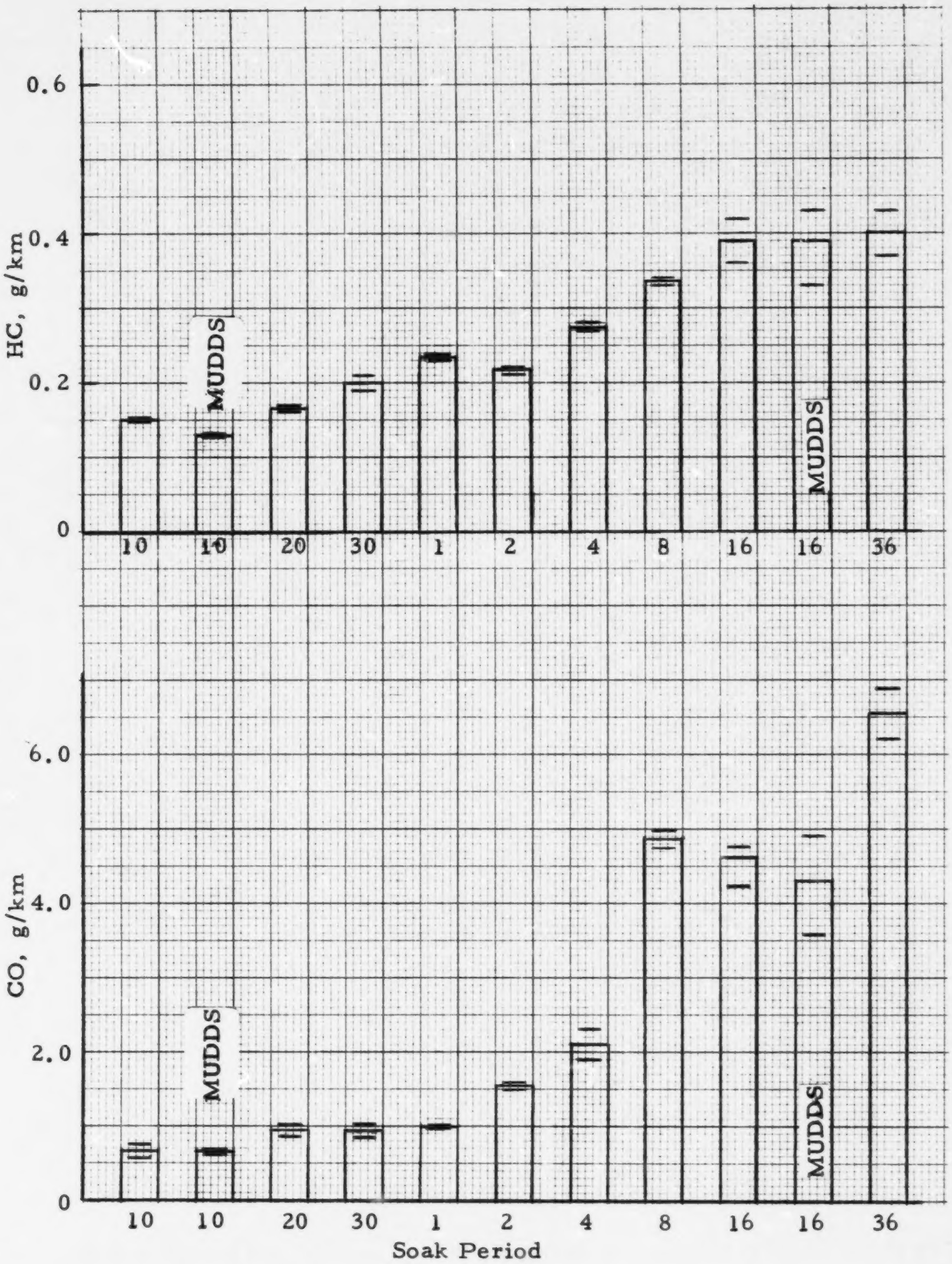


FIGURE 20. COLD START, 23 MINUTE UDDS - 2 BAG EMISSION RATES
1976 Chevrolet Vega

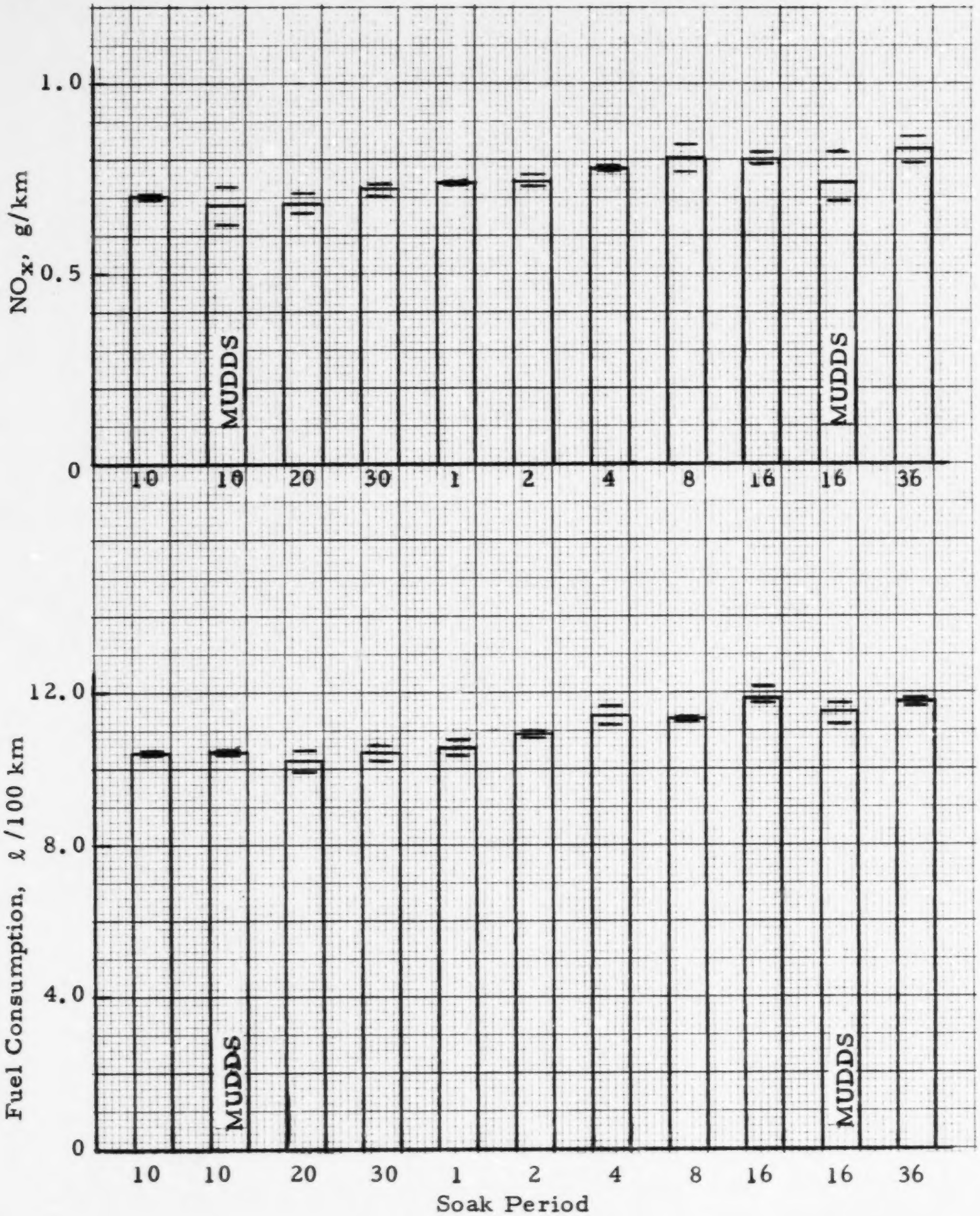


FIGURE 21. COLD START, 23 MINUTE UDDS - 2 BAG EMISSION RATES
1976 Chevrolet Vega

was data following the two hour soak period. Both tests at that condition agreed well, and all data was closely checked and should be considered valid. Some variation could be seen in HC emission rates in the last 867 seconds of the cycle, but the variation was small and was not clearly a function of soak period length.

CO emission rates in the first 505 seconds of the UDDS were fairly constant following soak periods from 20 minutes to one hour in length, but were slightly lower following the 10 minute soak period. During this portion of the cycle, the CO emission rates increased with soak period length in the two to eight hour range, were approximately equal following soak periods of eight and 16 hours, but were considerably higher following the 36 hour soak period. During the last 867 seconds of the cycle, CO emission rates increased very slightly with longer soak period over the entire range of soak periods tested.

NO_x emission rates in the first 505 seconds of the UDDS increased slightly with longer soak periods over the entire range of lengths tested. In the last 867 seconds of the cycle, NO_x emission rates following soak periods up to four hours were approximately equal, as they were following soak periods of eight hours and longer. The NO_x rates following the eight hour and longer soak periods were slightly higher than those following the shorter soak periods. Fuel consumption during both portions of the cycle followed a general trend of increasing with longer soak period lengths, with the trend being more noticeable in the first 505 second portion.

2. Comparison of Baseline and Modified Driving Cycles

Details of the statistical comparisons of emission rates and fuel consumption during baseline and modified driving cycles are shown in Table 12. For the highway cycles, the "t" test showed significant differences between HC, and NO_x emission rates. Average values for the modified cycle were higher in each case, as shown in Figure 22. Actual values from each HFET and MHFET are listed in Table D-3 in Appendix D.

In the case of the urban cycles, a "t" test showed significant differences in NO_x emission rates and fuel consumption between the two cycles following the 16 hour soak periods, with lower NO_x values and fuel consumption during the modified cycle. For tests following 10 minute soak periods, a "t" test showed a significant difference in HC and NO_x emission rates and fuel consumption between the two cycles, each value being lower for the modified cycle. A graphic comparison of the urban cycles can be seen in Figures 20 and 21, where results from the modified cycle are plotted alongside the baseline results.

TABLE 12. STATISTICAL "t" TEST COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING BASELINE AND MODIFIED DRIVING CYCLES

1976 Chevrolet Vega

Cycle		ν	$.975t_{\nu}$	d	$S_{\bar{d}}$	t	Significant Difference
HFET vs MHFET	HC	4	2.776	0.01	0.0000	367.40	yes
10 min soak	CO	4	2.776	0.07	0.0017	1.21	no
	NO_x	4	2.776	0.15	0.0090	16.23	yes
	F.C.	4	2.776	0.07	0.0799	0.83	no
UDDS vs MUDDS	HC	4	2.776	0.00	0.0015	0.00	no
16 hr soak	CO	4	2.776	0.31	0.2227	1.39	no
	NO_x	4	2.776	0.06	0.0020	28.15	yes
	F.C.	4	2.776	0.41	0.0689	5.95	yes
UDDS vs MUDDS	HC	2	4.303	0.02	0.0000		yes
10 min soak	CO	2	4.303	0.02	0.0090	2.22	no
	NO_x	2	4.303	0.03	0.0050	5.00	yes
	F.C.	2	4.303	0.02	0.0031	4.80	yes

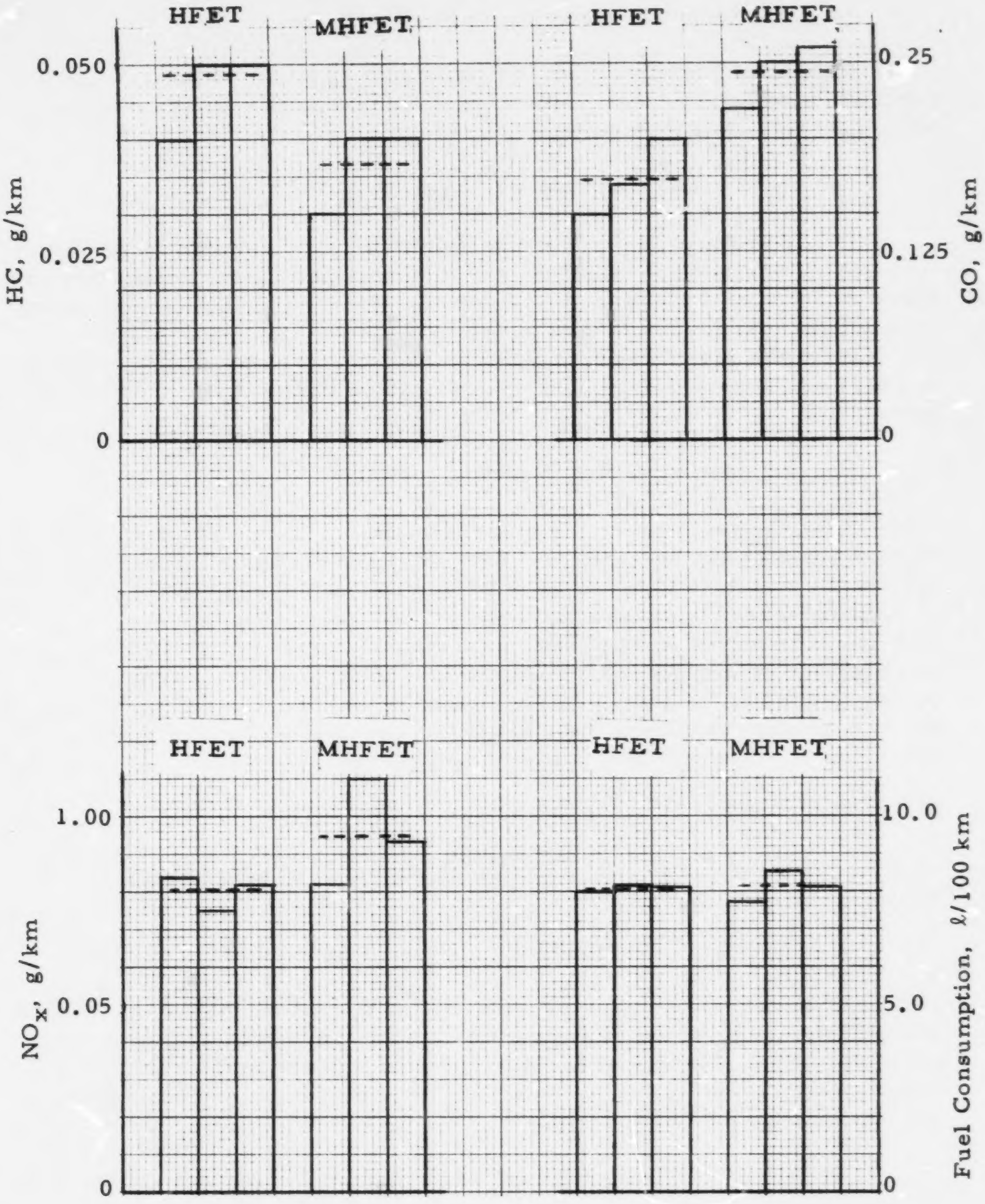


FIGURE 22. COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING HFET AND MHFET
1976 Chevrolet Vega

3. Repeatability Between Replicate Tests

Table 13 contains emission rate and fuel consumption results from all tests and the mean, standard deviation, and coefficient of variation for tests at each condition.

4. Temperature Measurement

In Appendix D the maximum, minimum, and average temperature for each component are tabulated and the averages for replicate tests are listed in Table D-4. Figure D-3 shows the average temperatures during each length soak period. Also in Appendix D, as Figures D-4 and D-5, are bar graphs of average temperatures during transient cycles following specific length soak periods. The related data is listed in Table D-5 in Appendix D.

5. Sequential Bag Sampling

The emission rates and fuel consumption calculated using the eight sequential bag samples are listed in Appendix D as Tables D-6 through D-16. Also listed in each table is the difference between masses measured with the eight bag samples and masses measured with the 505 second sample bag. The masses measured using the two procedures usually agreed within five percent. Also in Appendix D, bar graphs of the eight bag sequences for each test condition, and bar graphs comparing the eight bag sequences of the UDDS and MUDDS are shown in Figures D-6 through D-18.

E. Car Number 5 - 1976 Honda Civic CVCC

The following is a description of the major findings from testing the Honda Civic.

1. Length of Soak Period

Emission rates and fuel consumption during the UDDS and MUDDS are shown in bar graphs in Figures 23 and 24. In Appendix E results of all tests, as well as emission rates and fuel consumption for each bag sample, are tabulated and averages for each portion of replicate tests are listed in Table E-2.

As shown in Figures 23 and 24, substantially lower HC and CO values were measured on the Civic following soak period lengths of two hours and less than following longer soak periods. Although some variation was noticeable with soak periods of two hours and less,

TABLE 13. MEAN, STANDARD DEVIATION, AND COEFFICIENT OF VARIATION FOR EMISSION RATES AND FUEL CONSUMPTION OF REPLICATE TESTS

1976 Chevrolet Vega

		10 min Soak UDDS	10 min Soak MUDDS	20 min Soak UDDS	30 min Soak UDDS	1 hr Soak UDDS	2 hr Soak UDDS	4 hr Soak UDDS	8 hr Soak UDDS	16 hr Soak UDDS	16 hr Soak MUDDS	36 hr Soak UDDS	HFET	MHFET
HC, g/km	1	0.15	0.13	0.16	0.19	0.23	0.21	0.28	0.33	0.42	0.43	0.37	0.04	0.03
	2	0.15	0.13	0.17	0.21	0.24	0.22	0.27	0.34	0.38	0.33	0.43	0.05	0.04
	3									0.36	0.40		0.05	0.04
	$\bar{x}$	0.15	0.13	0.17	0.20	0.24	0.22	0.28	0.34	0.39	0.39	0.40	0.05	0.04
	S_x	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.05	0.04	0.01	0.01
	C_v, %	0.00	0.00	4.29	7.07	3.01	3.29	2.57	2.11	7.90	13.27	10.61	12.37	15.75
CO, g/km	1	0.57	0.61	1.02	0.95	0.99	1.58	1.90	4.99	4.76	4.90	6.89	0.15	0.22
	2	0.75	0.67	0.85	0.71	0.99	1.49	2.30	4.75	4.26	3.58	6.21	0.17	0.25
	3									4.83	4.44		0.20	0.26
	$\bar{x}$	0.66	0.64	0.94	0.83	0.99	1.54	2.10	4.87	4.62	4.31	6.55	0.17	0.24
	S_x	0.13	0.04	0.12	0.17	0.00	0.06	0.28	0.17	0.31	0.67	0.48	0.03	0.02
	C_v, %	19.28	6.63	12.86	20.45	0.00	4.15	13.47	3.48	6.73	15.56	7.34	14.52	8.55
NO_x, g/km	1	0.70	0.63	0.66	0.70	0.74	0.73	0.80	0.84	0.82	0.72	0.86	0.84	0.82
	2	0.71	0.73	0.71	0.73	0.73	0.76	0.75	0.77	0.79	0.82	0.79	0.75	1.10
	3									0.79	0.69		0.82	0.93
	$\bar{x}$	0.71	0.68	0.69	0.72	0.74	0.75	0.78	0.81	0.80	0.74	0.83	0.80	0.95
	S_x	0.01	0.07	0.04	0.02	0.01	0.02	0.04	0.05	0.02	0.07	0.05	0.05	0.14
	C_v, %	1.00	10.40	5.16	2.97	0.96	2.85	4.56	6.15	2.17	9.16	6.00	5.88	14.85
Fuel Cons., ℓ/100 km	1	10.45	10.39	9.93	10.22	10.77	10.82	11.65	11.32	11.64	11.69	11.85	8.00	7.71
	2	10.40	10.49	10.47	10.62	10.36	10.98	11.13	11.37	12.17	11.72	11.66	8.16	8.58
	3									12.00	11.17		8.06	8.13
	$\bar{x}$	10.43	10.44	10.20	10.42	10.57	10.90	11.39	11.35	11.94	11.53	11.76	8.07	8.14
	S_x	0.04	0.07	0.38	0.28	0.29	0.11	0.37	0.04	0.27	0.31	0.13	0.08	0.44
	C_v, %	0.34	0.68	3.74	2.71	2.74	1.04	3.23	0.31	2.27	2.68	1.14	1.00	5.35

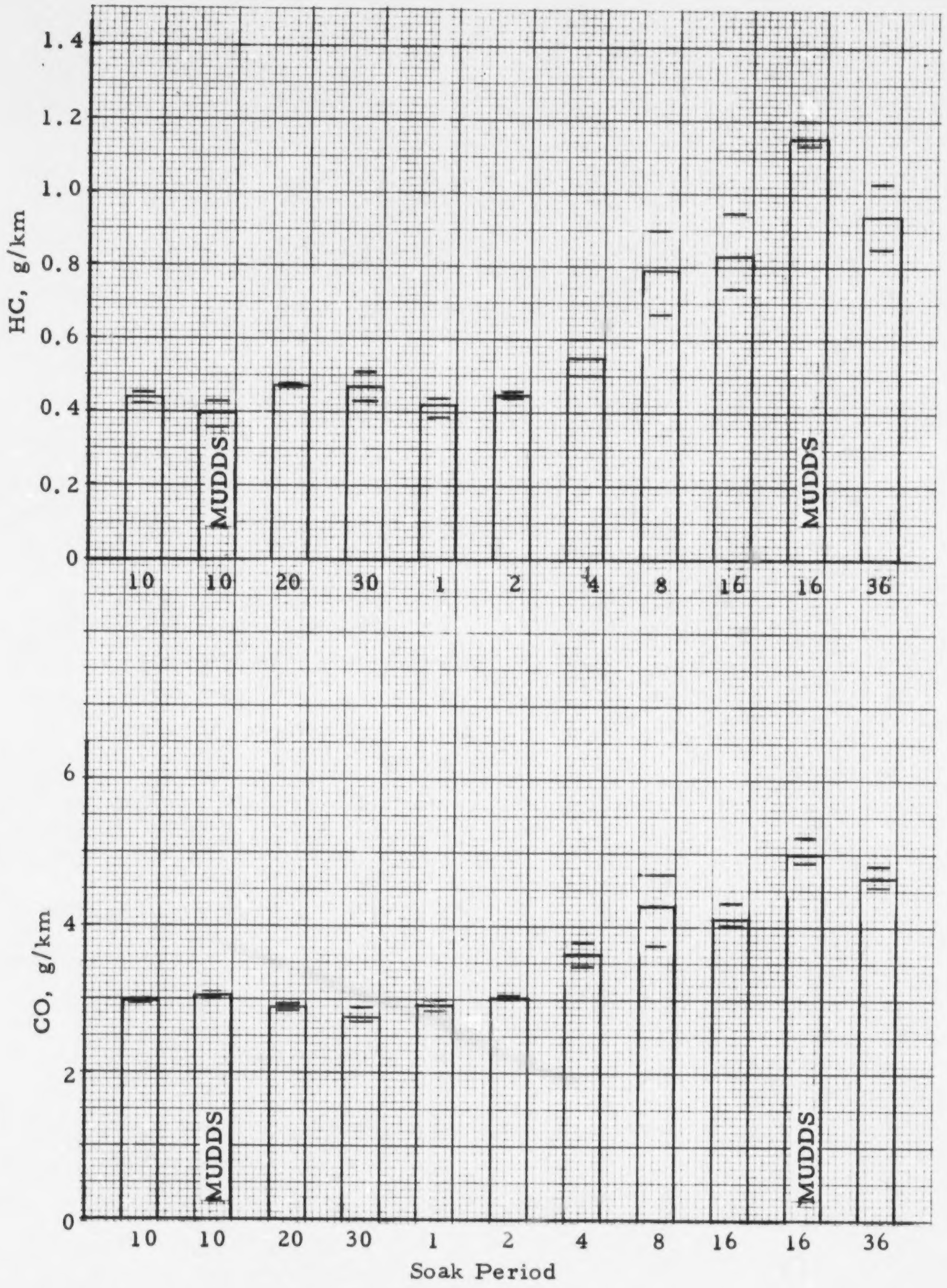


FIGURE 23. COLD START, 23 MINUTE UDDS - 2 BAG EMISSION RATES
1976 Honda Civic CVCC

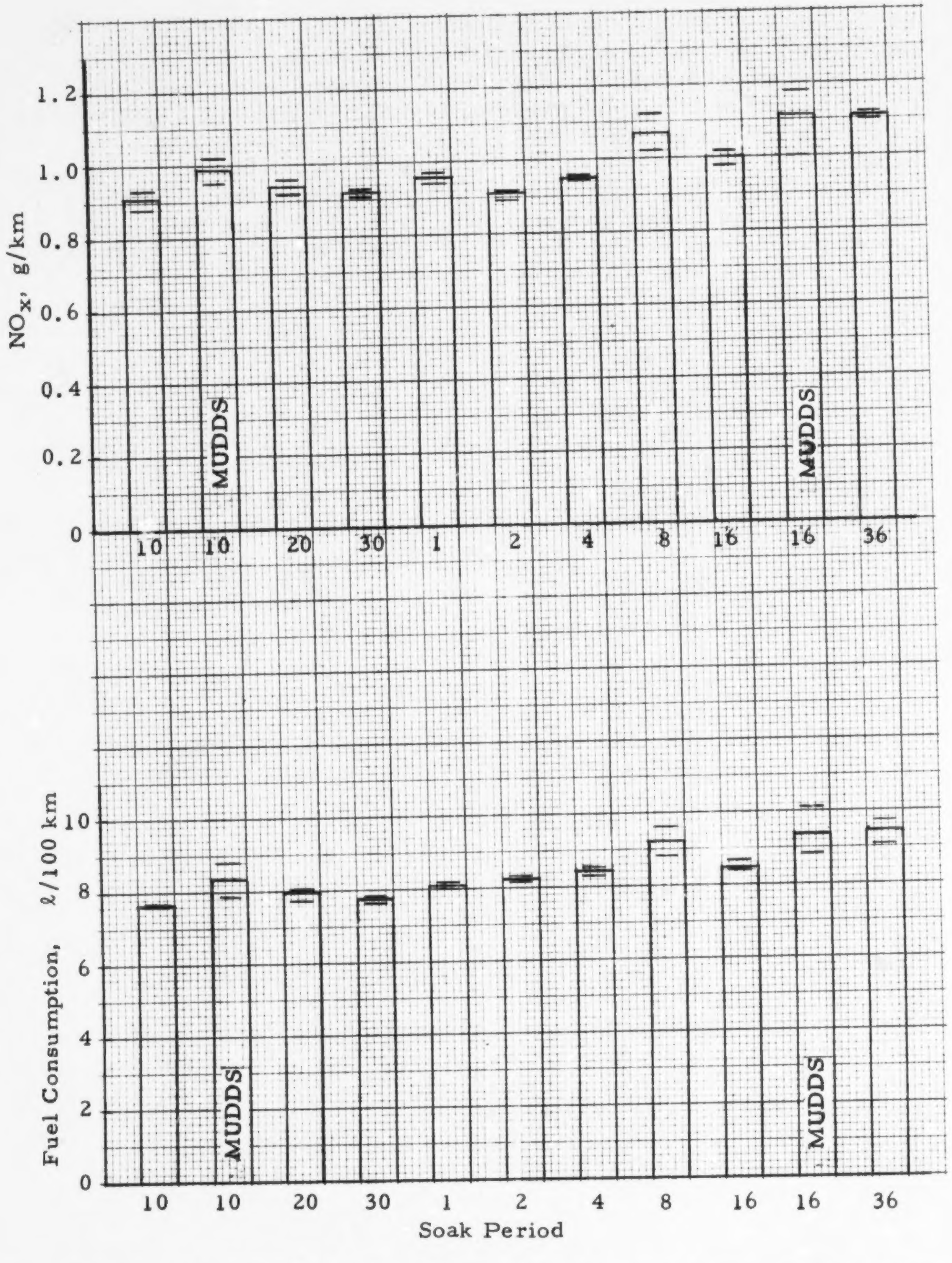


FIGURE 24. COLD START, 23 MINUTE UDDS - 2 BAG EMISSION RATES
1976 Honda Civic CVCC

the amount of variation was small relative to the average values. For tests following soak periods of four hours and longer, CO and HC emission rates increased sharply. NO_x values measured following soak periods of four hours and less did not change significantly with variation in soak period length, even though the expanded scale in Figure 2 accents the variation between tests. NOx values in tests following eight hour and longer soak periods were noticeably higher than those with shorter soak lengths. Fuel consumption was not clearly affected by soak periods of 30 minutes and less, but increased slightly with soak period lengths of one hour and longer.

Emission rates and fuel consumption for the first 505 seconds and the last 867 seconds of the UDDS following each length soak period are shown in Figures E-1 and E-2 in Appendix E. During the first 505 seconds, HC and CO emission rates were not clearly a function of soak period length with soak periods of two hours and less. Following soak periods of four hours and longer, HC and CO emission rates during the first 505 seconds increased sharply with longer soak periods. HC and CO emissions for the last 867 seconds of the cycle were not noticeably affected by soak periods of two hours and less, but were affected by soak lengths of four hours and longer. With the longer soak lengths, the last 867 second HC emission rates decreased slightly and CO emission rates increased slightly.

NO_x emission rates during the first 505 seconds of the UDDS were not affected by soak lengths of four hours and less, but were higher following soak lengths of eight hours and longer. NO_x emission rates during the last 867 seconds behaved like those of the first 505 seconds; fairly constant with four hour and shorter soak periods, but increased slightly with soak lengths of eight hours and longer. Fuel consumption in both portions of the cycle was unaffected by soak lengths of 30 minutes and shorter, but increased slowly with longer soak lengths.

2. Comparison of Baseline and Modified Driving Cycles

Details of the statistical comparisons of emission rates and fuel consumption during baseline and modified driving cycles are shown in Table 14. The "t" test showed significant differences between HC, CO, and NO_x emission rates and fuel consumption between the two highway cycles. Average values for the modified cycle were higher in each case, as shown in Figure 25. Actual values from each fuel economy test are listed in Table E-3 in Appendix E.

TABLE 14. STATISTICAL "t" TEST COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING BASELINE AND MODIFIED DRIVING CYCLES

1976 Honda Civic CVCC

Cycle		ν	$_{.975}t_{\nu}$	d	$S_{\bar{d}}$	t	Significant Difference
HFET vs MHFET	HC	4	2.776	0.03	0.0002	150.00	yes
10 min soak	CO	4	2.776	0.50	0.0068	74.00	yes
	NO_x	4	2.776	0.41	0.0050	82.66	yes
	F.C.	4	2.776	0.43	0.0136	31.53	yes
UDDS vs MUDDS	HC	4	2.776	0.32	0.0055	58.71	yes
16 hr soak	CO	4	2.776	0.89	0.0328	27.13	yes
	NO_x	4	2.776	0.11	0.0081	13.6	yes
	F.C.	4	2.776	0.83	0.1927	4.31	yes
UDDS vs MUDDS	HC	2	4.303	0.04	0.0015	26.67	yes
10 min soak	CO	2	4.303	0.03	0.0007	46.15	yes
	NO_x	2	4.303	0.08	0.0019	42.11	yes
	F.C.	2	4.303	0.52	0.2026	2.57	no

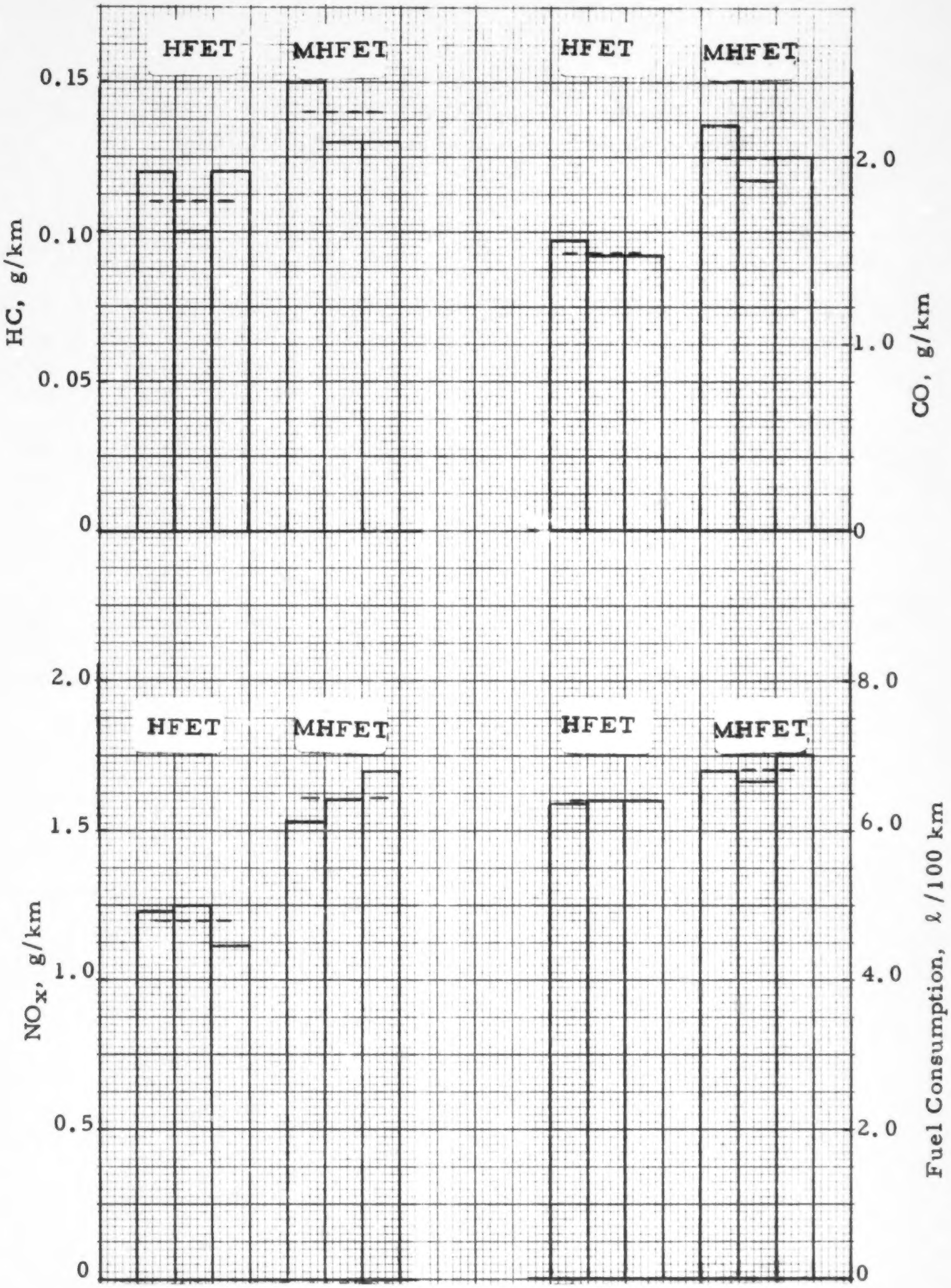


FIGURE 25. COMPARISON OF EMISSION RATES AND FUEL CONSUMPTION DURING HFET AND MODIFIED HFET FOLLOWING 10 MINUTE SOAK
1976 Honda Civic CVCC

In the case of the urban cycles, the "t" test showed significant differences in HC, CO, and NO_x emission rates and fuel consumption between the two cycles following the 16 hour soak periods, with higher emission values and fuel consumption during the modified cycle. A "t" test showed significant differences in HC, CO, and NO_x emission rates between the two cycles following a 10 minute soak, with higher CO and NO_x emission rates in the modified cycle but higher HC emission rates in the UDDS. The test did not indicate a significant difference in fuel consumption between the two cycles when preceded by a 10 minute soak. A graphic comparison of the urban cycles can be seen in Figures 23 and 24, where results for the modified cycle are plotted alongside baseline results.

3. Repeatability Between Replicate Tests

Table 15 contains the emission rate and fuel consumption results for all tests and the mean, standard deviation, and coefficient of variation for tests at each condition.

4. Temperature Measurement

In Appendix E, in Table E-4, the maximum, minimum, and average temperatures for each component are tabulated, and average temperatures for replicate tests are listed. Average temperatures during each length soak period for the Honda Civic are shown in Figure E-3. Bar graphs of average temperatures during transient cycles following each length soak period are also included in Appendix E as Figures E-4 and E-5, and the related data is listed in Table E-5.

5. Sequential Sampling

Emission rates and fuel consumption calculated from the eight sequential CVS bag samples are listed in Tables E-6 through E-16 in Appendix E. The total mass of each gas measured during the eight bag sequence of each test was compared to the mass of that gas measured with the 505 second bag. This data is included in the tables of sequential bag results. Bar graphs of the eight bag sequences for each test condition, and bar graphs comparing the eight bag results of the UDDS and MUDDS are also in Appendix E as Figures E-6 through E-18.

TABLE 15. MEAN, STANDARD DEVIATION, AND COEFFICIENT OF VARIATION FOR EMISSION RATES AND FUEL CONSUMPTION OF REPLICATE TESTS
1976 Honda Civic CVCC

		10 min Soak UDDS	10 min Soak MUDDS	20 min Soak UDDS	30 min Soak UDDS	1 hr Soak UDDS	2 hr Soak UDDS	4 hr Soak UDDS	8 hr Soak UDDS	16 hr Soak UDDS	16 hr Soak MUDDS	36 hr Soak UDDS	HFET	MHFET
HC, g/km	1	0.42	0.36	0.47	0.51	0.34	0.45	0.60	0.67	0.95	1.20	1.03	0.12	0.15
	2	0.45	0.43	0.47	0.43	0.44	0.46	0.50	0.90	0.74	1.13	0.85	0.10	0.13
	3									0.80	1.13		0.12	0.13
	$\bar{x}$	0.44	0.40	0.47	0.46	0.39	0.46	0.55	0.79	0.83	1.15	0.94	0.11	0.14
	S_x	0.02	0.05	0.00	0.06	0.07	0.01	0.07	0.16	0.11	0.04	0.13	0.01	0.01
	C_v, %	4.55	12.50	0.00	12.77	17.95	2.17	12.73	20.25	13.25	3.48	13.83	9.09	7.14
CO, g/km	1	2.95	3.06	2.85	2.68	2.84	3.03	3.79	3.76	4.33	4.87	4.83	1.55	2.12
	2	2.99	3.09	2.94	2.79	3.00	3.04	3.45	4.82	3.94	4.89	4.53	1.47	1.88
	3									4.03	5.22		1.47	2.00
	$\bar{x}$	2.97	3.08	2.90	2.74	2.92	3.04	3.62	4.29	4.10	4.99	4.68	1.50	2.00
	S_x	0.03	0.02	0.06	0.08	0.11	0.01	0.24	0.75	0.20	0.20	0.21	0.05	0.12
	C_v, %	1.01	0.65	2.07	2.92	3.77	0.33	6.63	17.48	4.88	4.01	4.49	3.33	6.00
NO_x, g/km	1	0.88	0.95	0.96	0.91	0.97	0.92	0.95	1.02	0.89	1.00	1.12	1.23	1.53
	2	0.93	1.02	0.92	0.92	0.94	0.89	0.94	1.12	1.01	1.15	1.14	1.25	1.61
	3									1.09	1.18		1.12	1.70
	$\bar{x}$	0.91	0.99	0.94	0.92	0.96	0.91	0.95	—	1.00	1.11	1.13	1.20	1.61
	S_x	0.04	0.05	0.03	0.01	0.02	0.02	0.01	0.07	0.10	0.10	0.01	0.07	0.09
	C_v, %	4.40	5.05	3.19	1.09	2.08	2.20	1.05	6.54	10.00	9.01	0.88	5.83	5.59
Fuel Cons., ℓ/100 km	1	7.83	7.89	8.05	7.63	8.11	8.28	8.32	8.78	8.43	8.81	9.77	6.37	6.82
	2	7.81	8.79	7.87	7.84	8.05	8.19	8.51	9.63	8.68	9.15	9.08	6.42	6.66
	3									8.48	10.11		6.42	7.07
	$\bar{x}$	7.82	8.34	7.96	7.74	8.08	8.24	8.42	9.21	8.53	9.36	9.43	6.40	6.83
	S_x	0.01	0.64	0.13	0.15	0.04	0.06	0.13	0.60	0.13	0.67	0.49	0.03	0.18
	C_v, %	0.13	7.67	1.63	1.94	0.50	0.73	1.54	6.51	1.52	7.16	5.20	0.47	2.64

APPENDIX A

SUMMARIZED TEST DATA
1976 CHEVROLET IMPALA

TABLE A-1. TEST NUMBERS CORRESPONDING TO DYNAMOMETER TESTS AT EACH CONDITION

1976 Chevrolet Impala

Test Type	Replication 1	2	3
UDDS			
10 min soak	24	25	
20 min soak	22	23	
30 min soak	20	21	
1 hr soak	18	19	
2 hr soak	16	17	
4 hr soak	12	27	
8 hr soak	13	26	
16 hr soak	1	2	3
36 hr soak	10	11	
MUDDS			
10 min soak	7	15	
16 hr soak	4	6	8
HFET			
10 min soak	1	2	3
MHFET			
10 min soak	5	7	8

TABLE A-2. EMISSION AND FUEL ECONOMY RESULTS, URBAN DRIVING CYCLES · 1976 Chevrolet Impala

			HC, g/km			CO, g/km			NO_x, g/km			Fuel Consumption ℓ/100 km		
Soak Length	Test No.	Date	505(1) sec	867(2) sec	Cycle(3)	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle
						UDDS								
10 min	24	3/29/77	0.32	0.10	0.21	3.13	1.55	2.31	1.12	0.70	0.90	17.76	19.12	18.44
	25	3/29/77	0.34	0.10	0.22	5.72	1.38	3.46	1.11	0.81	0.96	17.17	19.39	18.30
		Average	0.33	0.10	0.22	4.43	1.47	2.89	1.12	0.76	0.93	17.47	19.26	18.37
			(0.53)(4)	(0.16)	(0.35)	(7.13)	(2.37)	(4.65)	(1.80)	(1.22)	(1.50)	(13.47)(5)	(12.21)	(12.81)
20 min	22	3/29/77	0.31	0.11	0.20	2.90	1.82	2.33	1.24	0.78	1.00	17.64	19.25	18.45
	23	3/29/77	0.44	0.11	0.27	4.66	1.49	3.01	1.18	0.79	0.98	17.99	19.28	18.63
		Average	0.38	0.11	0.24	3.78	1.66	2.67	1.21	0.79	0.99	17.82	19.27	18.54
			(0.61)	(0.18)	(0.39)	(6.08)	(2.67)	(4.30)	(1.95)	(1.27)	(1.59)	(13.20)	(12.21)	(12.69)
30 min	20	3/29/77	0.57	0.11	0.33	5.30	1.14	3.13	1.21	0.81	1.00	18.48	19.69	19.08
	21	3/29/77	0.53	0.11	0.31	3.23	1.86	2.52	1.19	0.79	0.98	17.49	20.00	18.77
		Average	0.55	0.11	0.32	4.27	1.50	2.83	1.20	0.80	0.99	17.99	19.85	18.93
			(0.88)	(0.17)	(0.51)	(6.87)	(2.41)	(4.55)	(1.93)	(1.29)	(1.59)	(13.08)	(11.85)	(12.43)
1 hr	18	3/28/77	0.70	0.12	0.40	5.50	0.82	3.06	1.28	0.83	1.04	18.48	20.03	19.25
	19	3/28/77	0.66	0.12	0.38	4.38	1.06	2.65	1.28	0.84	1.05	18.83	20.11	19.46
		Average	0.68	0.12	0.39	4.94	0.94	2.86	1.28	0.84	1.05	18.66	20.07	19.36
			(1.09)	(0.19)	(0.63)	(7.95)	(1.51)	(4.60)	(2.06)	(1.35)	(1.69)	(12.61)	(11.72)	(12.15)
2 hr	16	3/28/77	0.89	0.12	0.49	6.58	1.70	4.03	1.27	0.80	1.02	19.45	20.78	20.11
	17	3/28/77	0.82	0.10	0.45	5.97	1.21	3.49	1.30	0.82	1.05	19.29	19.74	19.49
		Average	0.86	0.11	0.47	6.28	1.46	3.76	1.29	0.81	1.04	19.37	20.26	19.80
			(1.38)	(0.17)	(0.76)	(10.10)	(2.35)	(6.05	(2.08)	(1.30)	(1.67)	(12.14)	(11.61)	(11.88)
4 hr	14	3/25/77	0.82	0.12	0.46	9.14	1.55	5.18	1.31	0.78	1.04	19.85	20.44	20.12
	27	4/1/77	0.83	0.13	0.47	8.48	1.12	4.64	1.41	0.81	1.10	19.75	19.40	19.53
		Average	0.83	0.13	0.47	8.81	1.34	4.91	1.36	0.80	1.07	19.80	19.92	19.83
			(1.34)	(0.21)	(0.76)	(14.18)	(2.16)	(7.90)	(2.19)	(1.29)	(1.72)	(11.88)	(11.81)	(11.86)
8 hr	13	3/24/77	0.86	0.11	0.47	12.71	2.14	7.20	1.65	0.81	1.22	21.70	20.91	21.25
	26	3/31/77	0.71	0.11	0.40	7.83	0.93	4.23	1.58	0.81	1.18	19.99	19.49	19.70
		Average	0.79	0.11	0.44	10.27	1.54	5.72	1.62	0.81	1.20	20.85	20.20	20.48
			(1.27)	(0.18)	(0.71)	(16.52)	(2.48)	(9.20)	(2.61)	(1.30)	(1.93)	(11.28)	(11.65)	(11.49)
16 hr	1	3/10/77	1.19	0.13	0.64	22.30	3.41	12.45	1.44	0.78	1.10	20.97	20.94	20.91
	2	3/11/77	1.07	0.15	0.59	19.50	1.96	10.36	1.59	0.83	1.20	20.93	20.85	20.84
	3	3/14/77	1.04	0.15	0.58	17.59	2.96	9.96	1.60	0.79	1.18	2[illegible]96	21.71	21.31
		Average	1.10	0.15	0.60	19.80	2.78	10.92	1.54	0.80	1.16	20.95	21.17	21.02
			(1.77)	(0.24)	(0.97)	(31.86)	(4.47)	(17.57)	(2.48)	(1.29)	(1.87)	(11.23)	(11.11)	(11.19)
36 hr	10	3/21/77	1.01	0.14	0.56	18.93	2.08	10.15	1.42	0.78	1.09	20.66	20.84	20.71
	11	3/23/77	0.93	0.14	0.52	16.74	1.51	8.80	1.67	0.82	1.23	21.87	20.42	21.07
		Average	0.97	0.14	0.56	17.84	1.80	9.48	1.55	0.80	1.16	21.27	20.63	20.89
			(1.56)	(0.23)	(0.90)	(28.70)	(2.90)	(15.25)	(2.49)	(1.29)	(1.87)	(11.06)	(11.40)	(11.26)
						MUDDS								
10 min	7	3/16/77	0.47	0.12	0.23	2.17	1.15	1.46	1.20	0.98	1.05	22.80	17.94	19.39
	15	3/25/77	0.37	0.16	0.22	1.69	4.52	3.65	1.10	0.85	0.93	22.46	17.84	19.22
		Average	0.42	0.14	0.23	1.93	2.84	2.56	1.15	0.92	0.99	22.63	17.89	19.31
			(0.68)	(0.23)	(0.37)	(3.11)	(4.57)	(4.12)	(1.85)	(1.48)	(1.59)	(10.40)	(13.15)	(12.18)
16 hr	4	3/15/77	1.47	0.18	0.57	24.43	2.43	9.15	1.63	0.99	1.19	27.20	18.80	21.32
	6	3/16/77	1.35	0.16	0.53	19.37	2.89	7.92	1.55	0.92	1.11	26.51	18.19	20.69
	8	3/17/77	1.42	0.16	0.55	22.87	2.39	8.64	1.28	0.98	1.07	25.73	18.38	20.58
		Average	1.41	0.17	0.55	22.22	2.57	8.57	1.49	0.96	1.13	26.48	18.46	20.86
			(2.27)	(0.27)	(0.88)	(35.75)	(4.14)	(13.79)	(2.40)	(1.54)	(1.82)	(8.88)	(12.74)	(11.28)

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(1) First 505 second bag results

(2) Last 867 second bag results

(3) 23 minute cycle composite

(4) g/mi

(5) mi/gal

TABLE A-3. EMISSION AND FUEL ECONOMY RESULTS OF HFET AND MODIFIED HFET

1976 Chevrolet Impala

Test Cycle	Test No.	Date Run	HC, g/km	CO, g/km	NO_x, g/km	Fuel Consumption, ℓ/100 km
HFET	1	3/10/77	0.07	0.70	1.11	13.93
	2	3/11/77	0.07	0.33	1.28	13.76
	3	3/14/77	0.07	0.62	1.11	13.96
	Average		0.07	0.55	1.17	13.88
			(0.11)(1)	(0.88)(1)	(1.88)(1)	(16.95)(2)
MHFET	5	3/15/77	0.08	0.56	1.32	14.52
	7	3/16/77	0.07	0.32	1.32	13.79
	8	3/17/77	0.05	0.40	1.30	14.51
	Average		0.07	0.43	1.31	14.27
			(0.11)	(0.69)	(2.11)	(16.48)

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(1) g/mi

(2) mi/gal

TABLE A-4. SOAK TEMPERATURE DATA, 1976 CHEVROLET IMPALA

			Temperature, °C														
			Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
Soak Length	Test No.	Soak Date(s)	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
10 min	24	3/29/77	55	39	50	102	91	97	104	102	103	47	45	46	38	38	38
	25	3/29/77	56	40	50	102	91	97	105	103	104	49	48	49	41	41	41
	Overall Average				50			97			104			48			40
20 min	22	3/29/77	57	38	53	101	90	97	105	98	102	41	38	40	32	32	32
	23	3/29/77	57	39	51	102	91	98	104	99	102	44	42	43	35	35	35
	Overall Average				52			98			102			42			34
30 min	20	3/29/77	57	38	53	104	93	96	105	93	98	31	29	30	24	22	22
	21	3/29/77	56	39	52	101	90	93	104	94	97	37	34	35	29	28	28
	Overall Average				53			95			98			33			25
1 hr	18	3/28/77	60	40	57	103	79	92	105	76	93	34	29	32	29	28	29
	19	3/28/77	58	38	56	102	79	90	105	78	91	35	31	32	30	29	30
	Overall Average				57			91			92			32			30
2 hr	16	3/28/77	56	38	52	105	60	81	104	58	79	32	26	28	26	24	25
	17	3/28/77	56	40	52	102	59	79	102	58	79	33	27	29	27	25	26
	Overall Average				52			80			79			29			26
4 hr	14	3/25/77	53	34	45	94	36	60	96	42	62	31	27	28	27	26	27
	27	4/1/77	56	37	46	96	36	60	98	42	63	31	26	28	26	25	26
	Overall Average				46			60			63			28			27
8 hr	13	3/24/77	54	28	38	97	27	45	99	31	49	32	25	27	27	25	26
	26	3/31/77	53	29	38	95	27	44	97	31	49	32	24	27	27	24	26
	Overall Average				38			45			49			27			26
16 hr	1	3/9-3/10/77	55	24	32	90	24	30	100	25	39	33	23	25	27	23	25
	2	3/10-3/11/77	55	25	32	99	24	35	100	25	39	34	24	26	27	24	25
	3	3/13-3/14/77	53	24	30	93	24	33	90	24	36	28	24	25	25	24	24
	Overall Average				31			33			37			25			24
36 hr	10	3/19-3/21/77	54	24	28	97	24	29	96	24	31	31	24	25	27	24	25
	11	3/21-3/23/77	53	24	27	94	24	28	95	24	31	34	24	25	30	24	25
	Overall Average				28			29			31			25			25

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE A-5. TEMPERATURES MEASURED DURING VARIOUS TRANSIENT CYCLES
1976 Chevrolet Impala

Soak Length	Test No.	Date	Temperature, °C Inlet Air Max	 Min	 Avg	 Water Out Max	 Min	 Avg	 Oil Sump Max	 Min	 Avg	 Fuel Tank Vapor Max	 Min	 Avg	 Fuel Tank Liquid Max	 Min	 Avg
								UDDS									
10 min	24	3/29/77	37	55	40	100	85	91	107	98	105	49	45	47	40	38	40
	25	3/29/77	37	56	40	100	84	92	107	99	105	51	47	49	42	41	42
	Overall Average				40			92			105			48			41
20 min	22	3/29/77	57	38	40	95	84	91	106	95	103	44	37	41	36	32	35
	23	3/29/77	56	36	41	96	84	91	106	94	104	46	41	44	38	35	37
	Overall Average				41			91			104			43			36
30 min	20	3/29/77	55	36	40	95	82	90	105	91	102	36	30	33	28	24	27
	21	3/29/77	56	36	40	95	82	91	105	91	103	40	34	37	32	29	31
	Overall Average				40			91			103			35			29
1 hr	18	3/28/77	55	36	40	94	75	90	104	76	99	35	29	31	29	28	29
	19	3/28/77	52	36	40	95	75	90	105	78	100	36	31	34	31	29	30
	Overall Average				40			90			100			33			30
2 hr	16	3/28/77	48	35	40	93	60	87	102	58	92	32	25	28	26	23	25
	17	3/28/77	48	36	40	93	59	87	102	59	92	35	26	30	29	25	27
	Overall Average				40			87			92			29			26
4 hr	14	3/25/77	51	32	39	91	36	83	100	42	86	33	27	29	28	27	28
	27	3/31/77	51	32	39	91	35	83	100	42	86	30	26	28	26	25	26
	Overall Average				39			83			86			29			27
8 hr	13	3/24/77	53	27	39	90	26	80	99	31	83	32	25	28	28	25	26
	26	3/31/77	51	29	38	89	27	79	98	31	82	31	24	28	27	24	26
	Overall Average				39			80			83			28			26
16 hr	1	3/10/77	51	24	38	91	24	77	99	25	81	32	23	27	26	23	25
	2	3/11/77	52	25	39	89	25	79	99	25	81	32	25	27	26	24	25
	3	3/14/77	52	24	39	89	24	78	98	24	80	33	24	28	29	24	25
	Overall Average				39			79			81			27			25
36 hr	10	3/21/77	52	24	39	90	24	78	98	24	80	30	24	27	26	24	25
	11	3/23/77	53	24	38	90	24	78	99	24	80	31	24	27	27	24	25
	Overall Average				39			78			80			27			25
								MUDDS									
10 min	7	3/16/77	57	36	39	105	85	90	110	100	103	37	31	35	30	28	29
	15	3/25/77	54	37	39	97	82	89	104	95	101	38	34	36	31	29	31
	Overall Average				39			90			102			36			30
16 hr	4	3/15/77	51	24	36	94	25	76	105	25	74	30	24	26	28	24	25
	6	3/16/77	51	25	39	94	25	77	104	25	76	29	25	26	26	25	25
	8	3/17/77	51	25	39	95	25	77	104	25	76	30	25	27	27	25	26
	Overall Average				38			76			75			26			25
								HFET									
10 min	1	3/10/77	53	36	39	93	78	92	118	96	112	39	34	36	32	28	31
	2	3/11/77	52	36	39	96	82	92	119	94	110	37	33	34	30	26	29
	3	3/14/77	51	40	41	99	84	92	118	94	110	38	35	36	33	30	31
	Overall Average				40			92			111			35			30
								MHFET									
10 min	5	3/15/77	59	37	40	107	87	93	122	104	115	42	38	40	35	31	33
	7	3/16/77	58	37	40	106	87	93	121	104	115	41	38	39	34	31	32
	8	3/17/77	56	37	40	105	85	93	120	99	112	38	32	35	31	28	30
	Overall Average				40			93			114			38			32

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE A-6. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 10 MINUTE SOAK
1976 Chevrolet Impala

TEST NO. 24

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	.93	.89	2.66	4.03	3.86	11.51	214.2	205.0	612.0	.41	.39	1.17	26.95
2	.12	.11	.17	.56	.54	.78	242.4	231.6	336.7	.29	.28	.40	14.37
3	.11	.11	.46	1.01	.97	4.21	182.4	175.1	760.2	.38	.36	1.58	32.61
4	.31	.29	.23	7.21	6.82	5.26	513.2	485.7	374.6	2.27	2.15	1.66	16.40
5	.12	.11	.09	.27	.25	.19	348.8	329.1	249.1	.92	.87	.66	10.66
6	.05	.05	.09	.54	.52	.98	254.0	243.4	461.8	.66	.63	1.20	19.90
7	.06	.06	.14	.96	.92	2.29	208.0	198.7	495.2	.51	.49	1.21	21.90
8	.06	.06	.08	2.04	1.89	2.83	290.1	269.0	402.9	.72	.67	1.00	17.31
EIGHT BAG TOTAL	1.76			16.62			2253.2			6.16			
505 SEC BAG MASS	1.85			18.07			2367.2			6.48			
PERCENT DIFFERENCE	4.86			8.02			4.82			4.94			

TEST NO. 25

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	.85	.81	2.43	3.54	3.37	10.11	230.7	219.7	659.1	.43	.41	1.23	28.82
2	.13	.12	.18	.16	.15	.22	226.9	216.5	315.2	.33	.31	.46	13.42
3	.11	.10	.46	.86	.82	3.58	197.7	188.6	823.7	.46	.44	1.92	35.27
4	.61	.58	.45	25.41	24.28	18.55	568.5	543.2	415.0	2.27	2.17	1.66	19.05
5	.13	.12	.09	1.09	1.04	.78	382.2	363.4	273.0	1.06	1.01	.76	11.72
6	.06	.06	.11	.98	.93	1.78	249.9	238.0	454.3	.73	.70	1.33	19.64
7	.06	.06	.14	1.20	1.15	2.86	213.8	205.6	509.0	.55	.53	1.31	22.03
8	.09	.08	.13	1.50	1.37	2.08	327.4	299.9	454.8	.83	.76	1.15	19.46
EIGHT BAG TOTAL	2.04			34.74			2397.1			6.66			
505 SEC BAG MASS	1.97			33.07			2263.9			6.44			
PERCENT DIFFERENCE	-3.55			-5.05			-5.89			-3.42			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-7. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 20 MINUTE SOAK
1976 Chevrolet Impala

TEST NO. 22

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.73	.70	2.09	2.26	2.17	6.46	215.2	206.3	614.9	.36	.35	1.03	26.67
2	.12	.12	.17	.08	.08	.11	231.2	230.4	321.1	.34	.34	.47	13.66
3	.11	.10	.46	.72	.66	3.00	182.4	167.9	760.1	.41	.38	1.71	32.53
4	.38	.36	.28	9.89	9.29	7.22	512.5	481.2	374.1	2.44	2.29	1.78	16.52
5	.16	.15	.11	.32	.31	.23	361.0	344.9	257.8	1.09	1.04	.78	11.04
6	.06	.06	.11	.53	.50	.96	255.5	243.3	464.5	.73	.70	1.33	20.02
7	.05	.05	.12	.68	.64	1.62	204.9	193.0	487.8	.50	.47	1.19	21.03
8	.06	.06	.08	.50	.47	.69	285.1	266.9	396.0	.78	.73	1.08	16.87
EIGHT BAG TOTAL	1.67			14.98			2247.7			6.65			
505 SEC BAG MASS	1.80			16.73			2353.6			7.18			
PERCENT DIFFERENCE	7.22			10.46			4.50			7.38			

TEST NO. 23

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/. 100KM
1	1.42	1.36	4.06	3.45	3.30	9.86	216.4	206.7	618.3	.36	.34	1.03	27.29
2	.14	.13	.19	.35	.33	.49	234.9	224.4	326.2	.33	.32	.46	13.91
3	.11	.11	.46	.83	.79	3.46	184.1	176.2	767.2	.42	.40	1.75	32.86
4	.48	.45	.35	16.66	15.79	12.16	507.8	481.3	370.6	2.31	2.19	1.69	16.71
5	.13	.12	.09	.27	.26	.19	359.7	340.4	257.0	.97	.92	.69	11.00
6	.06	.06	.11	1.12	1.07	2.04	260.1	248.9	472.9	.77	.74	1.40	20.45
7	.07	.07	.17	1.03	.98	2.45	201.9	191.9	480.6	.51	.48	1.21	20.79
8	.07	.06	.10	.59	.54	.82	299.2	275.4	415.6	.78	.72	1.08	17.71
EIGHT BAG TOTAL	2.48			24.30			2264.1			6.45			
505 SEC BAG MASS	2.56			26.93			2382.2			6.80			
PERCENT DIFFERENCE	3.13			9.77			4.96			5.15			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-8. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 30 MINUTE SOAK

1976 Chevrolet Impala

TEST NO. 20

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.92	1.83	5.49	4.35	4.15	12.43	216.2	206.3	617.8	.40	.38	1.14	27.64
2	.20	.19	.28	.43	.41	.60	248.5	237.8	345.1	.32	.31	.44	14.73
3	.13	.12	.54	.87	.82	3.63	185.9	175.9	774.5	.40	.38	1.67	33.19
4	.54	.52	.39	18.54	17.71	13.53	522.5	499.2	38[illegible].4	2.38	2.27	1.74	17.27
5	.15	.14	.11	.34	.32	.24	350.3	333.6	250.2	.96	.91	.69	10.72
6	.05	.05	.09	.47	.45	.85	247.2	234.3	449.4	.68	.64	1.24	19.36
7	.07	.07	.17	1.25	1.19	2.98	198.3	189.5	472.1	.46	.44	1.10	20.46
8	.07	.07	.10	.46	.43	.64	290.1	269.4	402.9	.79	.73	1.10	17.16
EIGHT BAG TOTAL	3.13			26.71			2258.9			6.39			
505 SEC BAG MASS	3.29			30.60			2440.5			7.00			
PERCENT DIFFERENCE	4.86			12.71			7.44			8.71			

TEST NO. 21

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	2.05	1.94	5.86	3.88	3.67	11.09	218.9	206.8	625.5	.40	.38	1.14	27.92
2	.26	.25	.36	.27	.26	.38	246.1	236.7	341.9	.31	.30	.43	14.59
3	.12	.11	.50	.35	.33	1.46	184.4	175.9	768.2	.36	.34	1.50	32.78
4	.40	.38	.29	10.33	9.82	7.54	509.1	484.1	371.6	2.38	2.26	1.74	16.44
5	.14	.13	.10	.29	.27	.21	369.0	349.3	263.6	1.04	.98	.74	11.28
6	.05	.05	.09	.24	.23	.44	249.0	239.0	452.7	.70	.67	1.27	19.47
7	.05	.05	.12	.63	.59	1.50	216.5	203.6	515.4	.59	.55	1.40	22.21
8	.07	.07	.10	1.49	1.39	2.07	295.0	275.7	409.7	.84	.79	1.17	17.54
EIGHT BAG TOTAL	3.14			17.48			2288.0			6.62			
505 SEC BAG MASS	3.08			18.67			2326.9			6.87			
PERCENT DIFFERENCE	-1.95			6.37			1.67			3.64			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-9. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 1 HR SOAK

1976 Chevrolet Impala

TEST NO. 18

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.38	2.25	6.80	6.09	5.75	17.40	226.0	213.2	645.7	.43	.41	1.23	29.32
2	.49	.47	.68	1.67	1.60	2.32	258.5	247.8	359.0	.29	.28	.40	15.49
3	.21	.20	.87	.90	.86	3.75	193.3	185.2	805.2	.44	.42	1.83	34.55
4	.53	.51	.39	16.26	15.61	11.87	506.1	485.8	369.4	2.33	2.24	1.70	16.65
5	.15	.14	.11	.26	.25	.19	369.2	350.0	263.7	1.04	.99	.74	11.29
6	.06	.06	.11	.34	.32	.62	252.4	240.7	458.9	.77	.73	1.40	19.75
7	.07	.07	.17	.92	.86	2.19	211.9	198.1	504.6	.58	.54	1.38	21.80
8	.09	.08	.13	2.06	1.94	2.86	291.7	274.8	405.2	.80	.75	1.11	17.41
EIGHT BAG TOTAL	3.98			28.50			2309.1			6.68			
505 SEC BAG MASS	4.07			31.78			2436.8			7.37			
PERCENT DIFFERENCE	2.21			10.32			5.24			9.36			

TEST NO. 19

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.09	1.97	5.97	5.73	5.41	16.37	225.2	212.5	643.6	.41	.39	1.17	29.05
2	.43	.42	.60	1.92	1.86	2.67	251.2	243.5	348.8	.26	.25	.36	15.07
3	.24	.23	1.00	1.19	1.14	4.96	195.8	187.3	815.7	.39	.37	1.63	35.09
4	.48	.46	.35	11.04	10.51	8.06	509.7	485.4	372.0	2.46	2.34	1.80	16.50
5	.17	.16	.12	.12	.11	.09	374.3	355.3	267.3	1.06	1.01	.76	11.44
6	.06	.06	.11	.30	.29	.55	257.3	245.8	467.8	.74	.71	1.35	20.13
7	.07	.07	.17	.75	.71	1.79	208.5	197.6	496.4	.59	.56	1.40	21.42
8	.08	.07	.11	1.12	1.04	1.56	305.4	283.2	424.2	.83	.77	1.15	18.13
EIGHT BAG TOTAL	3.62			22.17			2327.4			6.74			
505 SEC BAG MASS	3.83			25.30			2494.4			7.41			
PERCENT DIFFERENCE	5.48			12.37			6.70			9.04			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-10. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 2 HR SOAK

1976 Chevrolet Impala

TEST NO. 16

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.55	2.44	7.29	8.13	7.77	23.23	238.7	228.0	681.9	.42	.40	1.20	31.30
2	.71	.67	.99	4.01	3.81	5.57	271.4	257.6	376.9	.31	.29	.43	16.51
3	.37	.36	1.54	2.58	2.49	10.75	205.6	198.3	856.6	.42	.41	1.75	37.29
4	.71	.66	.52	16.12	15.04	11.77	588.0	548.7	429.2	2.51	2.34	1.83	19.22
5	.20	.19	.14	1.02	.97	.73	385.0	367.8	275.0	1.09	1.04	.78	11.81
6	.08	.08	.15	1.13	1.07	2.05	267.5	253.5	486.3	.74	.70	1.35	21.03
7	.07	.07	.17	.87	.83	2.07	209.0	199.7	497.6	.55	.53	1.31	21.49
8	.09	.08	.13	1.82	1.68	2.53	312.6	289.0	434.2	.87	.80	1.21	18.62
EIGHT BAG TOTAL	4.78			35.68			2477.7			6.91			
505 SEC BAG MASS	5.11			38.00			2555.1			7.33			
PERCENT DIFFERENCE	6.46			6.11			3.03			5.73			

TEST NO. 17

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.43	2.32	6.94	7.57	7.22	21.63	230.1	219.5	657.5	.45	.43	1.29	30.12
2	.69	.66	.96	4.85	4.67	6.74	264.3	254.6	367.1	.33	.32	.46	16.16
3	.31	.29	1.29	2.54	2.40	10.58	195.4	184.4	814.3	.45	.42	1.87	35.45
4	.58	.56	.42	11.83	11.37	8.64	506.0	486.5	369.3	2.38	2.29	1.74	16.43
5	.20	.19	.14	.83	.78	.59	365.1	343.4	260.8	1.11	1.04	.79	11.20
6	.05	.05	.09	.55	.53	1.00	260.9	250.5	474.3	.73	.70	1.33	20.44
7	.05	.05	.12	1.01	.95	2.40	215.1	201.3	512.1	.60	.56	1.43	22.13
8	.06	.06	.08	1.28	1.20	1.78	294.0	276.1	408.4	.74	.69	1.03	17.47
EIGHT BAG TOTAL	4.37			30.46			2331.0			6.79			
505 SEC BAG MASS	4.75			34.49			2540.3			7.54			
PERCENT DIFFERENCE	8.00			11.68			8.24			9.95			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-11. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 4 HR SOAK

1976 Chevrolet Impala

TEST NO. 12

	HC			CO			CO_2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.44	1.39	4.11	5.93	5.73	16.94	268.8	259.7	768.0	1.18	1.14	3.37	34.09
2	.74	.71	1.03	6.74	6.44	9.36	278.4	266.0	386.7	.37	.35	.51	17.18
3	.40	.38	1.67	2.56	2.45	10.67	212.5	203.1	885.5	.49	.47	2.04	38.53
4	.73	.70	.53	13.32	12.79	9.72	603.4	579.2	440.4	2.87	2.76	2.09	19.56
5	.23	.22	.16	1.52	1.44	1.09	411.5	389.4	293.9	1.21	1.15	.86	12.64
6	.07	.07	.13	.53	.50	.96	275.4	260.6	500.7	.78	.74	1.42	21.57
7	.08	.08	.19	.67	.64	1.60	230.0	219.7	547.6	.65	.62	1.55	23.60
8	.07	.07	.10	.93	.87	1.29	317.5	296.2	440.9	.86	.80	1.19	18.82
EIGHT BAG TOTAL	3.76			32.20			2597.4			8.41			
505 SEC BAG MASS	3.29			33.23			2680.6			8.63			
PERCENT DIFFERENCE	-14.29			3.10			3.10			2.55			

TEST NO. 27

	HC			CO			CO_2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.12	2.04	6.06	9.92	9.55	28.34	251.8	242.5	719.3	1.06	1.02	3.03	33.05
2	.82	.77	1.14	7.90	7.42	10.97	258.4	242.6	358.9	.40	.38	.56	16.12
3	.45	.43	1.87	3.85	3.71	16.04	185.9	179.4	774.8	.42	.41	1.75	34.21
4	.81	.77	.59	19.16	18.10	13.99	535.3	505.8	390.8	2.33	2.20	1.70	17.73
5	.19	.18	.14	.91	.87	.65	364.5	346.6	260.4	1.02	.97	.73	11.18
6	.09	.09	.16	1.04	1.00	1.89	250.2	240.2	454.9	.79	.76	1.44	19.67
7	.09	.09	.21	1.71	1.63	4.07	220.8	209.9	525.7	.62	.59	1.48	22.83
8	.10	.09	.14	.95	.87	1.32	314.9	288.0	437.3	.88	.80	1.22	18.67
EIGHT BAG TOTAL	4.67			45.44			2381.8			7.52			
505 SEC BAG MASS	4.78			48.98			2578.8			8.16			
PERCENT DIFFERENCE	2.30			7.23			7.64			7.84			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-12. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 8 HR SOAK

1976 Chevrolet Impala

TEST NO. 13

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.92	1.82	5.49	16.68	15.81	47.66	303.5	287.7	867.3	1.46	1.38	4.17	40.50
2	.96	.92	1.33	12.09	11.55	16.79	283.6	271.0	393.9	.82	.78	1.14	18.02
3	.54	.52	2.25	5.09	4.93	21.21	226.4	219.1	943.2	.42	.41	1.75	41.76
4	1.03	.98	.75	28.79	27.38	21.01	542.1	515.5	395.7	2.56	2.43	1.87	18.44
5	.18	.17	.13	1.32	1.25	.94	398.5	376.5	284.6	1.11	1.05	.79	12.23
6	.08	.08	.15	.98	.93	1.78	262.0	249.1	476.4	.69	.66	1.25	20.59
7	.07	.07	.17	1.37	1.31	3.26	231.5	221.5	551.1	.57	.55	1.36	23.87
8	.09	.08	.13	1.93	1.78	2.68	332.0	306.0	461.1	.90	.83	1.25	19.77
EIGHT BAG TOTAL	4.87			68.25			2579.6			8.53			
505 SEC BAG MASS	4.95			73.41			2803.2			9.56			
PERCENT DIFFERENCE	1.62			7.03			7.98			10.77			

TEST NO. 26

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.30	1.26	3.71	10.73	10.37	30.66	283.0	273.4	808.5	1.37	1.32	3.91	36.66
2	.83	.79	1.15	8.99	8.56	12.49	259.1	246.8	359.8	.76	.72	1.06	16.26
3	.51	.50	2.13	4.35	4.24	18.12	201.6	196.7	840.1	.47	.46	1.96	37.16
4	.78	.73	.57	13.54	12.67	9.88	549.3	514.2	401.0	2.51	2.35	1.83	17.89
5	.21	.20	.15	1.46	1.39	1.04	372.2	355.6	265.8	1.13	1.08	.81	11.44
6	.08	.08	.15	1.05	.99	1.91	262.3	248.2	476.9	.76	.72	1.38	20.62
7	.06	.06	.14	.65	.62	1.55	210.0	199.7	500.1	.56	.53	1.33	21.56
8	.09	.08	.13	1.02	.94	1.42	310.9	287.4	431.8	1.03	.95	1.43	18.44
EIGHT BAG TOTAL	3.86			41.79			2448.4			8.59			
505 SEC BAG MASS	4.13			45.22			2619.9			9.15			
PERCENT DIFFERFNCE	6.54			7.59			6.55			6.12			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-13. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 16 HR SOAK
1976 Chevrolet Impala

TEST NO. 1

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.15	2.06	6.14	48.15	46.22	137.57	282.2	270.9	806.2	1.03	.99	2.94	43.98
2	1.43	1.36	1.99	26.17	24.84	36.35	269.7	256.1	374.6	.89	.84	1.24	18.59
3	1.43	1.38	5.96	17.15	16.52	71.46	253.7	244.4	1057.2	.67	.65	2.79	50.45
4	1.56	1.49	1.14	31.27	29.83	22.82	633.7	604.4	462.5	2.79	2.66	2.04	21.47
5	.24	.22	.17	3.89	3.64	2.78	420.4	393.5	300.3	1.12	1.05	.80	13.03
6	.09	.09	.16	1.63	1.56	2.96	265.4	254.8	482.6	.83	.80	1.51	20.94
7	.10	.09	.24	2.81	2.66	6.69	223.5	211.0	532.1	.60	.57	1.43	23.29
8	.15	.14	.21	4.53	4.19	6.29	321.0	296.8	445.9	.82	.76	1.14	19.38
EIGHT BAG TOTAL	7.15			135.60			2669.6			8.75			
505 SEC BAG MASS	6.86			128.83			2612.5			8.31			
PERCENT DIFFERENCE	-4.23			-5.25			-2.19			-5.29			

TEST NO. 2

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.03	1.94	5.80	37.73	36.11	107.80	297.1	284.3	848.7	1.43	1.37	4.09	43.75
2	1.24	1.19	1.72	19.70	18.97	27.36	263.4	253.7	365.9	.93	.90	1.29	17.59
3	1.14	1.08	4.75	16.05	15.21	66.87	254.9	241.6	1061.9	.79	.75	3.29	50.18
4	1.46	1.41	1.07	36.60	35.31	26.72	624.6	602.5	455.9	2.67	2.58	1.95	21.44
5	.15	.14	.11	1.28	1.23	.91	327.3	314.2	233.8	.84	.81	.60	10.06
6	.14	.13	.25	3.61	3.46	6.56	357.6	342.8	650.2	1.12	1.07	2.04	28.38
7	.09	.09	.21	2.05	2.02	4.88	210.1	207.0	500.3	.62	.61	1.48	21.80
8	.09	.08	.13	1.55	1.45	2.15	322.0	301.4	447.2	.90	.84	1.25	19.15
EIGHT BAG TOTAL	6.34			118.57			2657.0			9.30			
505 SEC BAG MASS	6.17			112.66			2633.6			9.21			
PERCENT DIFFERENCE	-2.76			-5.25			-.89			-.98			

TEST NO. 3

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.16	2.06	6.17	44.16	42.19	126.17	282.2	269.6	806.3	1.11	1.06	3.17	43.23
2	1.33	1.29	1.85	21.05	20.34	29.24	272.5	263.2	378.4	1.02	.99	1.42	18.26
3	1.13	1.06	4.71	15.34	14.43	63.92	253.8	238.7	1057.6	.68	.64	2.83	49.79
4	1.23	1.20	.90	16.54	16.19	12.07	630.5	617.2	460.2	2.94	2.88	2.15	20.62
5	.25	.23	.18	4.04	3.78	2.89	420.6	393.1	300.4	1.18	1.10	.84	13.04
6	.12	.11	.22	2.25	2.15	4.09	281.4	268.4	511.6	.82	.78	1.49	22.27
7	.10	.09	.24	2.35	2.23	5.60	237.0	225.0	564.4	.61	.58	1.45	24.60
8	.12	.11	.17	3.29	3.09	4.57	337.7	317.5	469.0	.95	.89	1.32	20.24
EIGHT BAG TOTAL	6.44			109.02			2715.7			9.31			
505 SEC BAG MASS	6.01			101.61			2656.1			9.22			
PERCENT DIFFERENCE	-7.15			-7.29			-2.24			-.98			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-14. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 36 HR SOAK
1976 Chevrolet Impala

TEST NO. 10

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.93	1.86	5.51	44.10	42.61	126.00	262.8	253.9	750.7	.84	.81	2.40	40.78
2	1.29	1.23	1.79	24.87	23.72	34.54	264.0	251.8	366.6	.89	.85	1.24	18.11
3	1.02	.97	4.25	12.04	11.48	50.17	249.1	237.6	1037.9	.64	.61	2.67	47.98
4	1.25	1.15	.91	24.52	22.60	17.90	603.7	556.4	440.7	2.55	2.35	1.86	20.17
5	.23	.22	.16	3.42	3.34	2.44	398.1	389.1	284.4	1.05	1.03	.75	12.33
6	.11	.10	.20	1.75	1.66	3.18	282.4	268.5	513.5	.74	.70	1.35	22.28
7	.08	.08	.19	1.24	1.18	2.95	233.1	220.9	555.0	.65	.62	1.55	24.01
8	.11	.10	.15	3.14	2.92	4.36	326.8	304.0	453.9	.89	.83	1.24	19.58
EIGHT BAG TOTAL	6.02			115.08			2620.0			8.25			
505 SEC BAG MASS	5.83			109.37			2604.2			8.23			
PERCENT DIFFERENCE	-3.26			-5.22			-.61			-.24			

TEST NO. 11

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.98	1.87	5.66	44.52	42.13	127.20	282.3	267.2	806.5	1.24	1.17	3.54	43.24
2	1.24	1.20	1.72	21.86	21.12	30.36	271.6	262.4	377.2	1.07	1.03	1.49	18.27
3	.89	.85	3.71	10.55	10.03	43.96	253.8	241.3	1057.5	.67	.64	2.79	48.33
4	1.08	1.04	.79	23.79	22.87	17.36	591.4	560.7	431.7	2.69	2.59	1.96	19.73
5	.23	.22	.16	2.10	1.97	1.50	424.0	398.8	302.9	1.26	1.18	.90	13.06
6	.08	.08	.15	.71	.68	1.29	270.2	259.0	491.4	.78	.75	1.42	21.20
7	.08	.08	.19	1.62	1.54	3.86	232.6	221.5	553.9	.68	.65	1.62	24.02
8	.09	.08	.13	1.79	1.66	2.49	323.9	300.4	449.9	.89	.83	1.24	19.28
EIGHT BAG TOTAL	5.67			106.94			2649.9			9.28			
505 SEC BAG MASS	5.38			96.72			2789.3			9.67			
PERCENT DIFFERENCE	-5.39			-10.57			5.00			4.03			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-15. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 10 MINUTE SOAK

1976 Chevrolet Impala

TEST NO. 7

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.15	1.10	1.92	4.49	4.28	7.48	286.5	272.8	477.4	.79	.75	1.32	21.31
2	.11	.11	.30	.90	.87	2.43	292.4	281.6	790.2	1.15	1.11	3.11	33.93
3	.13	.12	.20	.99	.94	1.50	263.5	249.4	399.3	.45	.43	.68	17.18
4	.05	.05	.13	.21	.20	.54	193.2	184.0	495.4	.32	.30	.82	21.41
5	.05	.05	.17	.13	.12	.45	184.5	174.6	636.2	.23	.22	.79	27.25
6	.05	.05	.13	.14	.13	.36	230.4	217.3	590.7	.39	.37	1.00	25.51
7	.07	.07	.16	.71	.68	1.65	233.6	224.6	543.3	.57	.55	1.33	23.09
8	.05	.05	.09	.16	.15	.29	209.3	193.2	373.8	.37	.34	.66	15.90
EIGHT BAG TOTAL	1.66			7.73			1893.3			4.27			
505 SEC BAG MASS	1.75			7.99			1948.8			4.41			
PERCENT DIFFERENCE	5.14			3.25			2.85			3.17			

TEST NO. 15

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.78	.75	1.30	3.13	3.00	5.22	296.1	283.3	493.5	.73	.70	1.22	21.76
2	.15	.14	.41	.62	.59	1.68	293.8	279.8	794.0	.98	.93	2.65	34.06
3	.13	.12	.20	.46	.44	.70	270.3	257.9	409.6	.46	.44	.70	17.57
4	.06	.06	.15	.14	.13	.36	204.4	194.4	524.1	.24	.23	.62	22.64
5	.05	.05	.17	.38	.36	1.31	184.7	174.8	636.9	.26	.25	.90	27.34
6	.07	.07	.18	.70	.66	1.79	235.9	222.2	604.8	.45	.42	1.15	26.22
7	.07	.07	.16	.41	.40	.95	237.4	230.5	552.2	.52	.50	1.21	23.42
8	.05	.05	.09	.22	.20	.39	207.4	192.0	370.4	.32	.30	.57	15.76
EIGHT BAG TOTAL	1.36			6.06			1930.0			3.96			
505 SEC BAG MASS	1.36			6.23			1923.8			4.04			
PERCENT DIFFERENCE	.00			2.73			-.32			1.98			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE A-16. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 16 HR SOAK
1976 Chevrolet Impala

TEST NO. 4

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.18	2.06	3.63	40.82	38.57	68.03	329.3	311.2	548.9	1.56	1.47	2.60	28.71
2	1.49	1.39	4.00	18.91	17.81	51.11	347.6	327.4	939.5	1.64	1.54	4.43	44.07
3	1.08	1.06	1.64	22.81	22.29	34.56	282.3	275.9	427.8	.64	.63	.97	20.81
4	.32	.30	.82	3.88	3.59	9.95	225.1	208.1	577.3	.36	.33	.92	25.68
5	.29	.27	.97	2.96	2.86	10.21	193.1	186.3	665.9	.22	.21	.76	29.28
6	.28	.27	.72	3.27	3.11	8.38	256.1	243.5	656.7	.48	.46	1.23	28.98
7	.16	.15	.37	1.40	1.34	3.26	261.1	249.9	607.2	.58	.56	1.35	25.92
8	.13	.12	.23	1.48	1.36	2.64	216.2	199.3	386.1	.35	.32	.63	16.60
EIGHT BAG TOTAL	5,91			95.53			2111.0			5.83			
505 SEC BAG MASS	5.42			90.03			2188.2			6.01			
PERCENT DIFFERENCE	-9.04			-6.11			3.53			3.00			

TEST NO. 6

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.20	2.10	3.67	38.33	36.56	63.88	331.1	315.8	551.8	1.67	1.59	2.78	28.56
2	1.33	1.28	3.59	13.21	12.68	35.70	358.8	344.5	969.8	1.73	1.66	4.68	44.28
3	.87	.83	1.32	17.97	17.11	27.23	272.4	259.5	412.8	.53	.50	.80	19.64
4	.29	.28	.74	2.47	2.36	6.33	210.0	200.3	538.5	.31	.30	.79	23.75
5	.18	.17	.62	1.72	1.60	5.93	197.1	183.9	679.6	.21	.20	.72	29.54
6	.14	.13	.36	.79	.76	2.03	247.4	236.7	634.4	.47	.45	1.21	27.54
7	.15	.14	.35	1.42	1.36	3.30	253.0	241.7	588.4	.54	.52	1.26	25.13
8	.07	.07	.13	.12	.11	.21	213.8	198.9	381.8	.37	.34	.66	16.24
EIGHT BAG TOTAL	5.23			76.03			2083.7			5.83			
505 SEC BAG MASS	4.99			71.37			2159.1			5.70			
PERCENT DIFFERENCE	-4.81			-6.53			3.49			-2.28			

TEST NO. 8

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.24	2.16	3.73	44.06	42.50	73.43	330.1	318.4	550.1	1.47	1.42	2.45	29.14
2	1.66	1.58	4.49	22.13	21.04	59.81	379.4	360.7	1025.4	1.82	1.73	4.92	48.38
3	1.08	1.02	1.64	20.39	19.33	30.89	287.3	272.4	435.3	.64	.61	.97	20.89
4	.38	.36	.97	5.22	5.01	13.38	222.6	213.7	570.7	.38	.36	.97	25.65
5	.26	.24	.90	2.62	2.44	9.03	212.7	198.1	733.3	.23	.21	.79	32.08
6	.21	.20	.54	2.20	2.12	5.64	256.4	247.0	657.5	.46	.44	1.18	28.80
7	.17	.16	.40	1.55	1.47	3.60	269.6	256.0	627.0	.57	.54	1.33	26.79
8	.13	.12	.23	1.87	1.79	3.34	213.5	199.3	381.3	.29	.27	.52	16.44
EIGHT BAG TOTAL	6.13			100.04			2171.6			5.86			
505 SEC BAG MASS	5.23			84.25			2070.7			4.72			
PERCENT DIFFERENCE	-17.21			-18.79			-4.87			-24.15			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

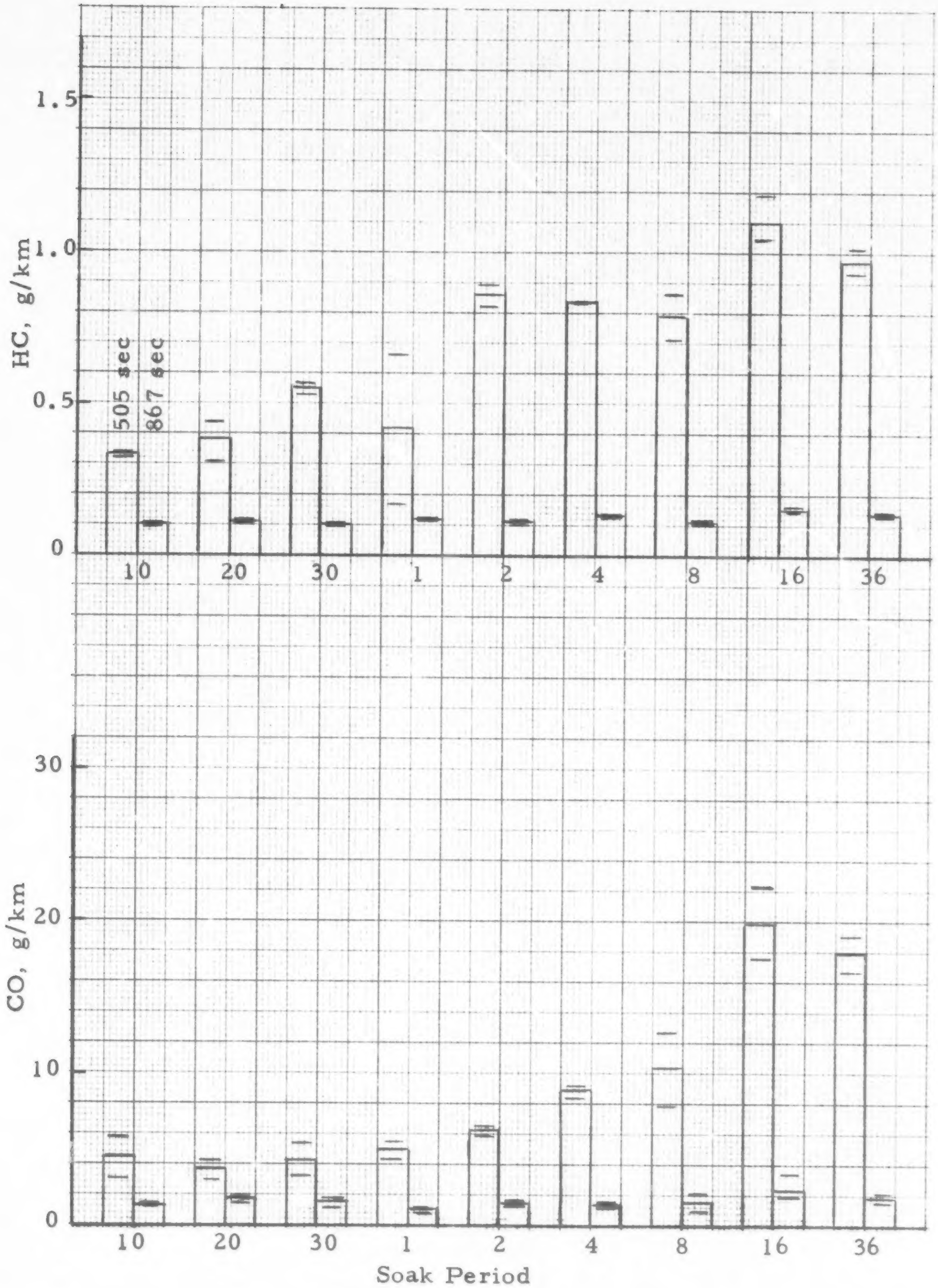

FIGURE A-1. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Chevrolet Impala

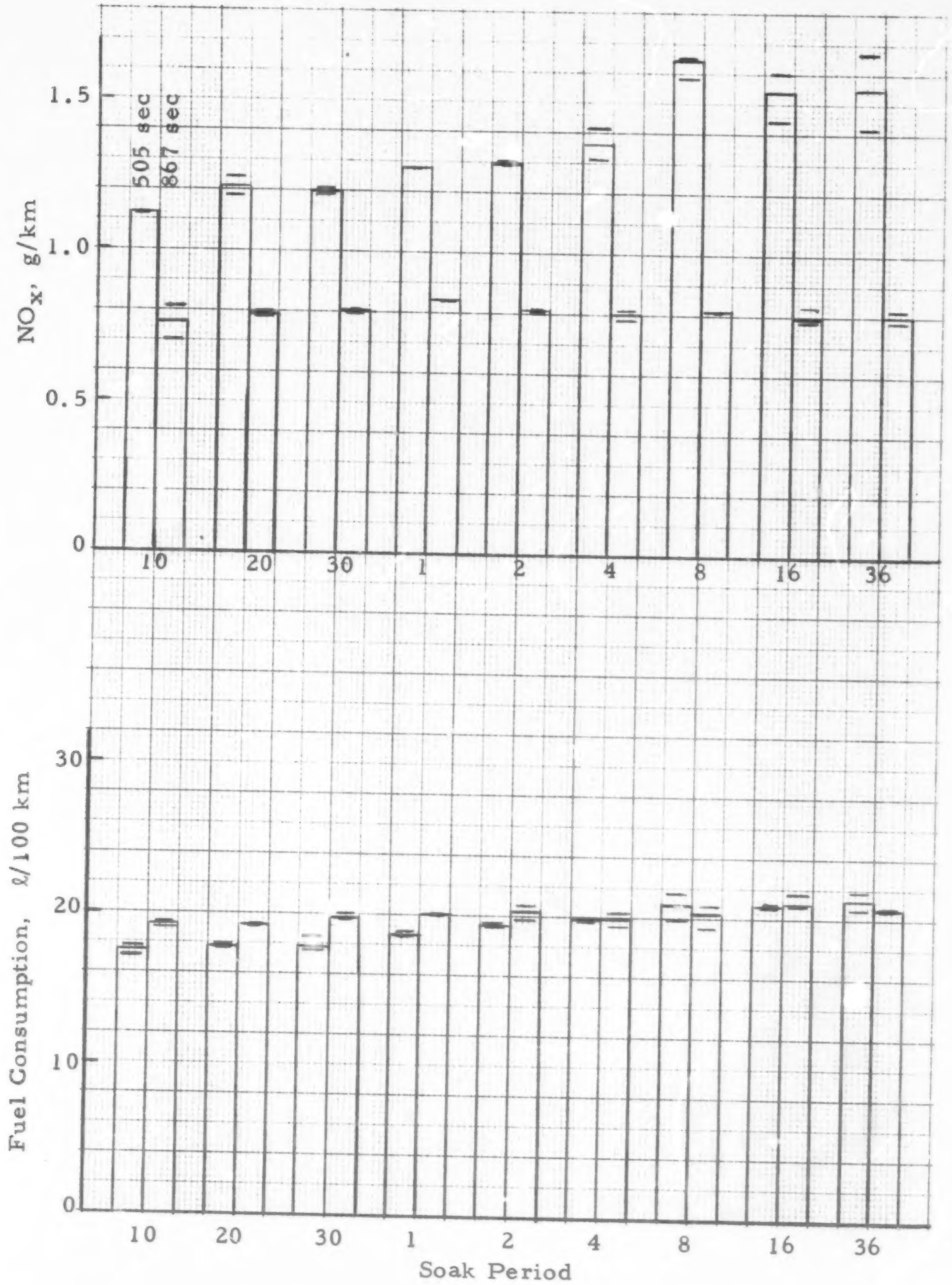

FIGURE A-2. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Chevrolet Impala

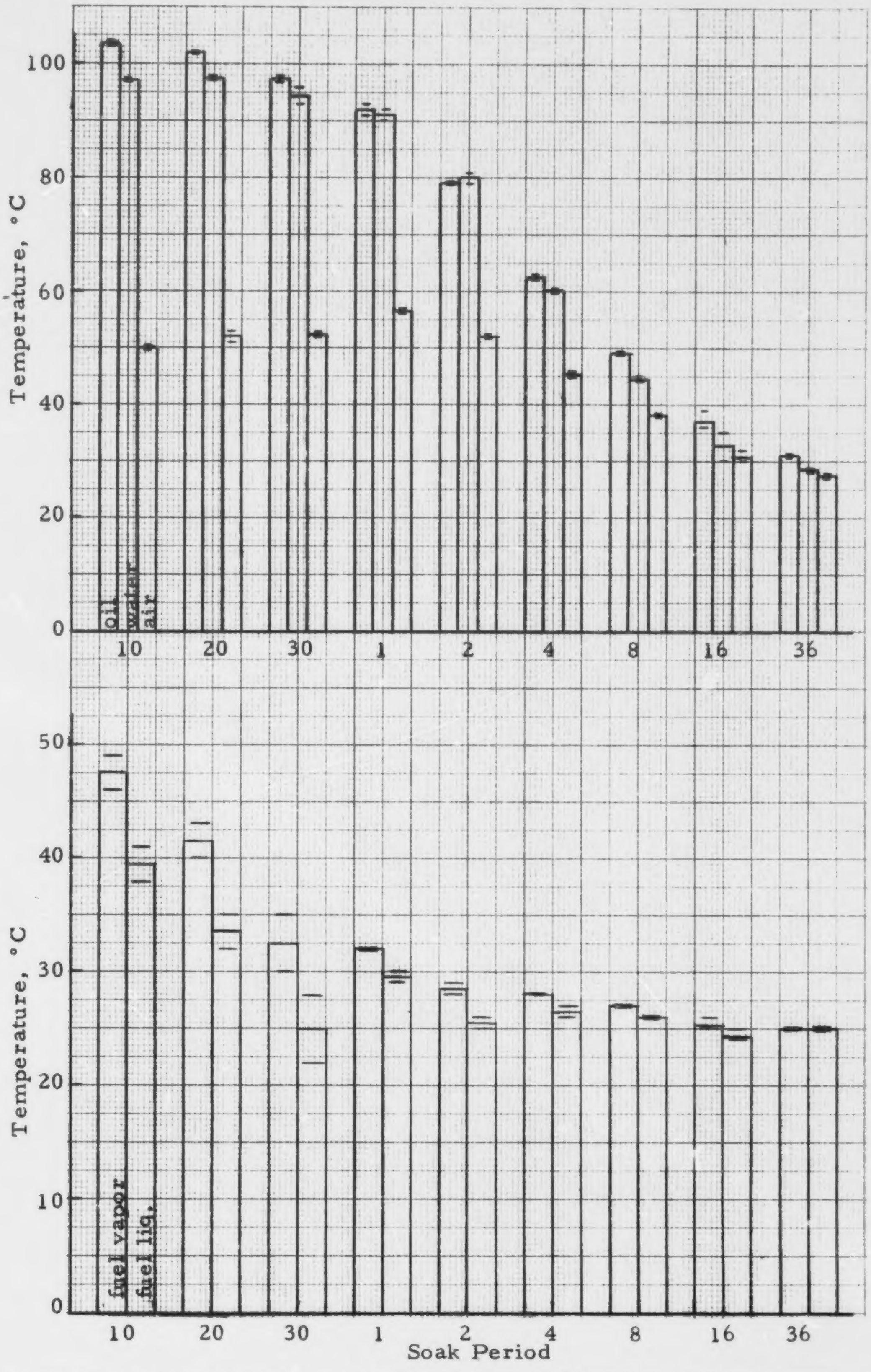

FIGURE A-3. AVERAGE TEMPERATURES DURING VARIOUS LENGTH SOAK PERIODS PRIOR TO DYNAMOMETER TESTS
1976 Chevrolet Impala

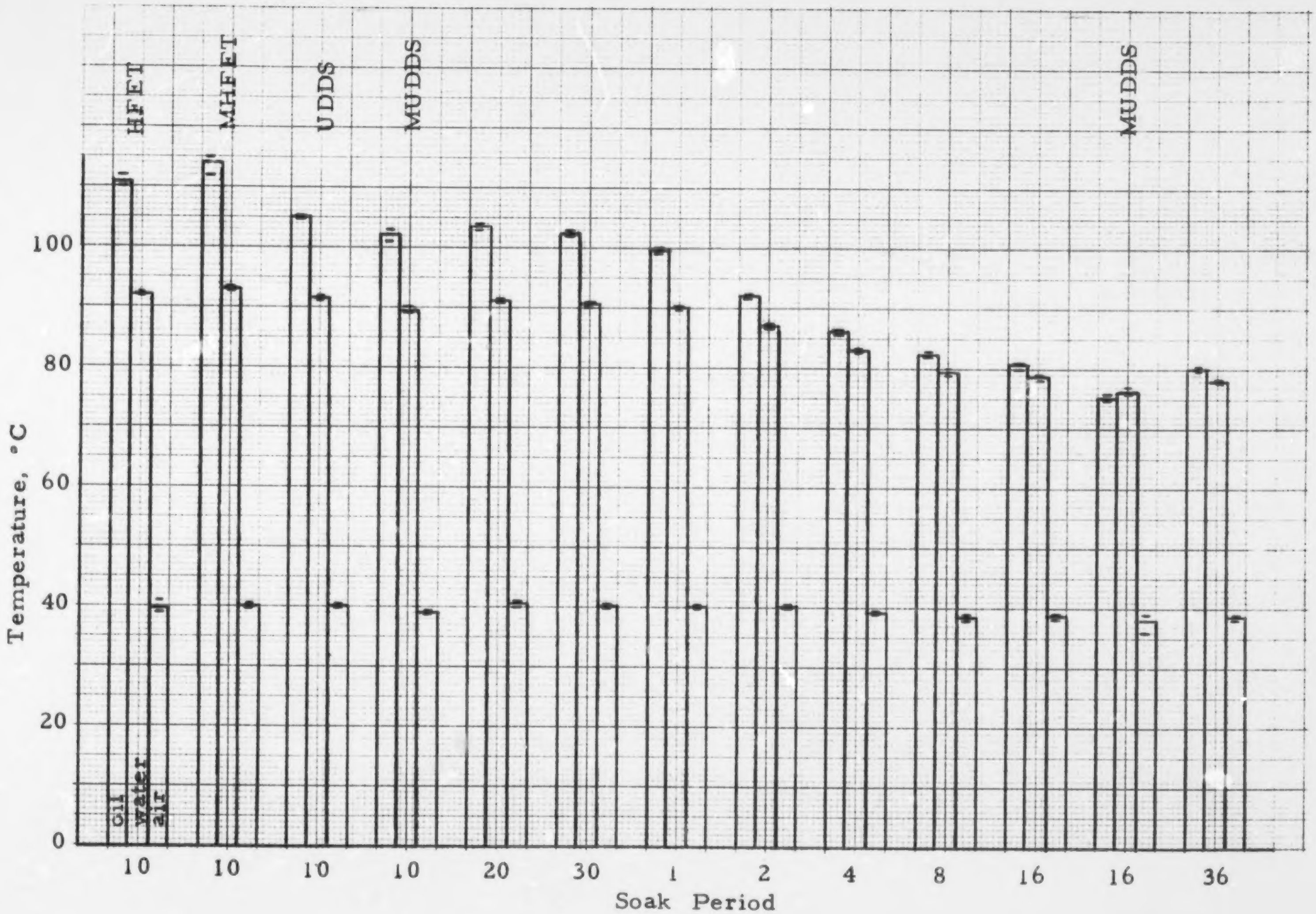

FIGURE A-4. AVERAGE OIL PAN, ENGINE WATER OUT, AND CARBURETOR INLET AIR TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Chevrolet Impala

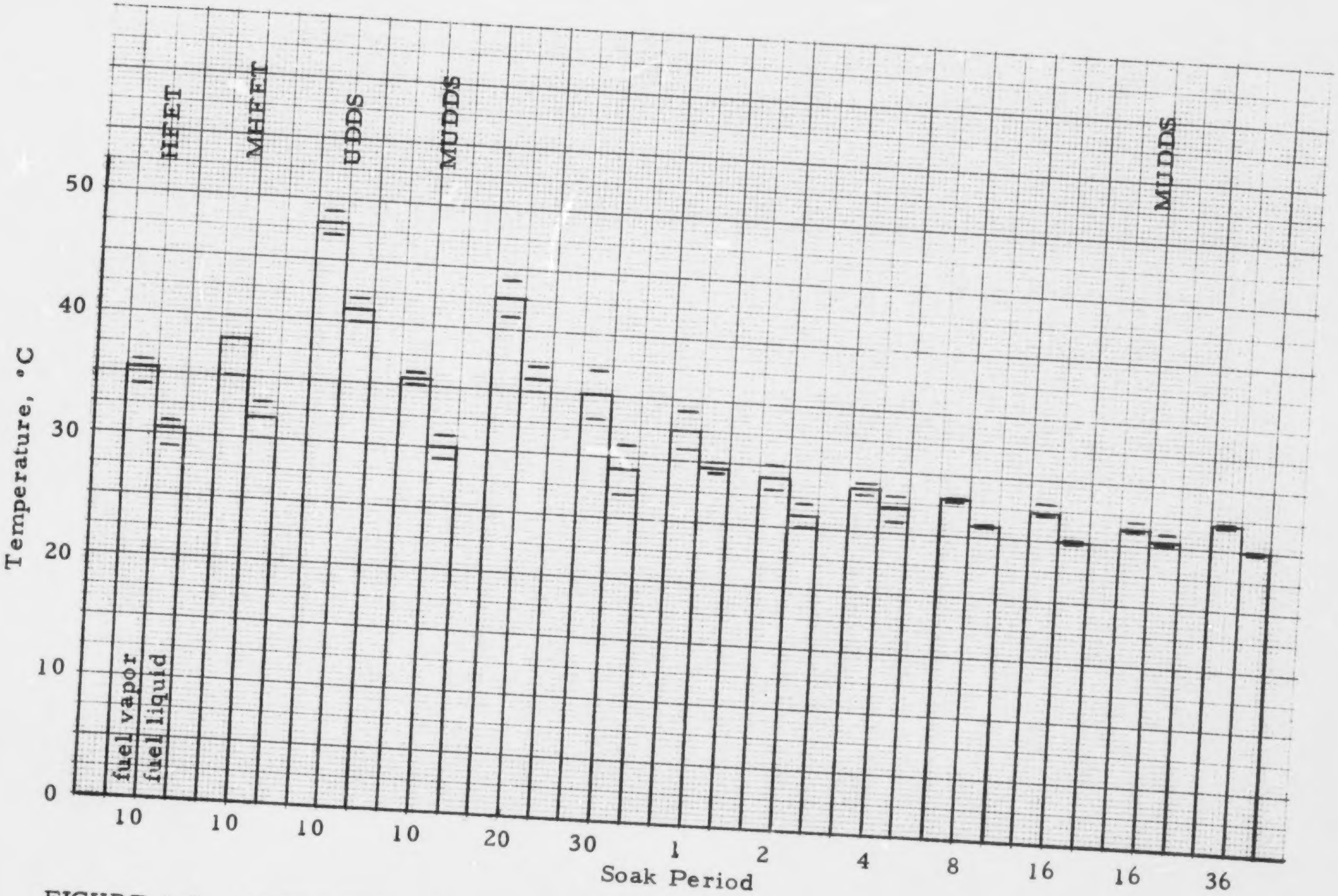

FIGURE A-5. AVERAGE FUEL TANK VAPOR AND FUEL TANK LIQUID TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Chevrolet Impala

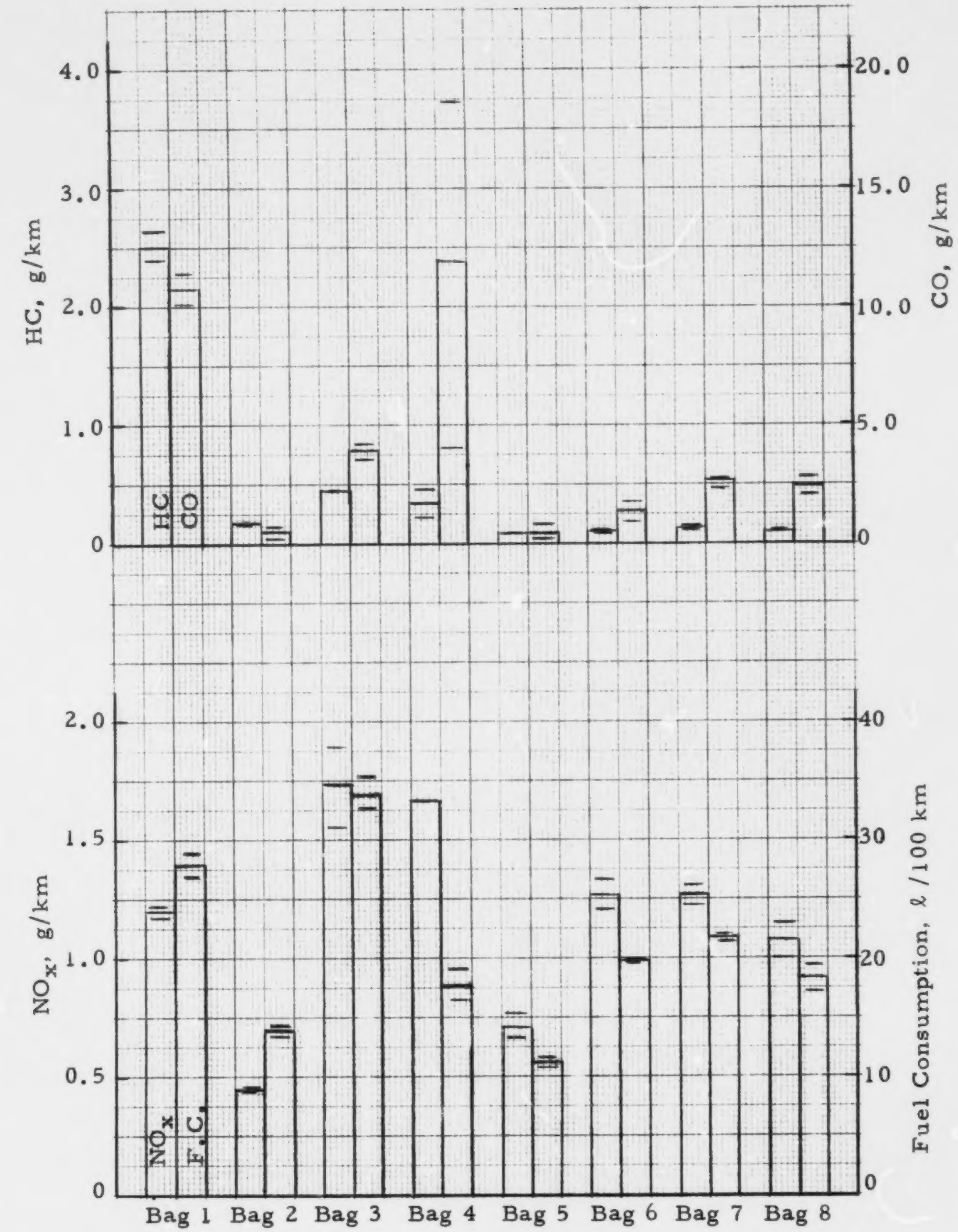

FIGURE A-6. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 10 MINUTE SOAK
1976 Chevrolet Impala

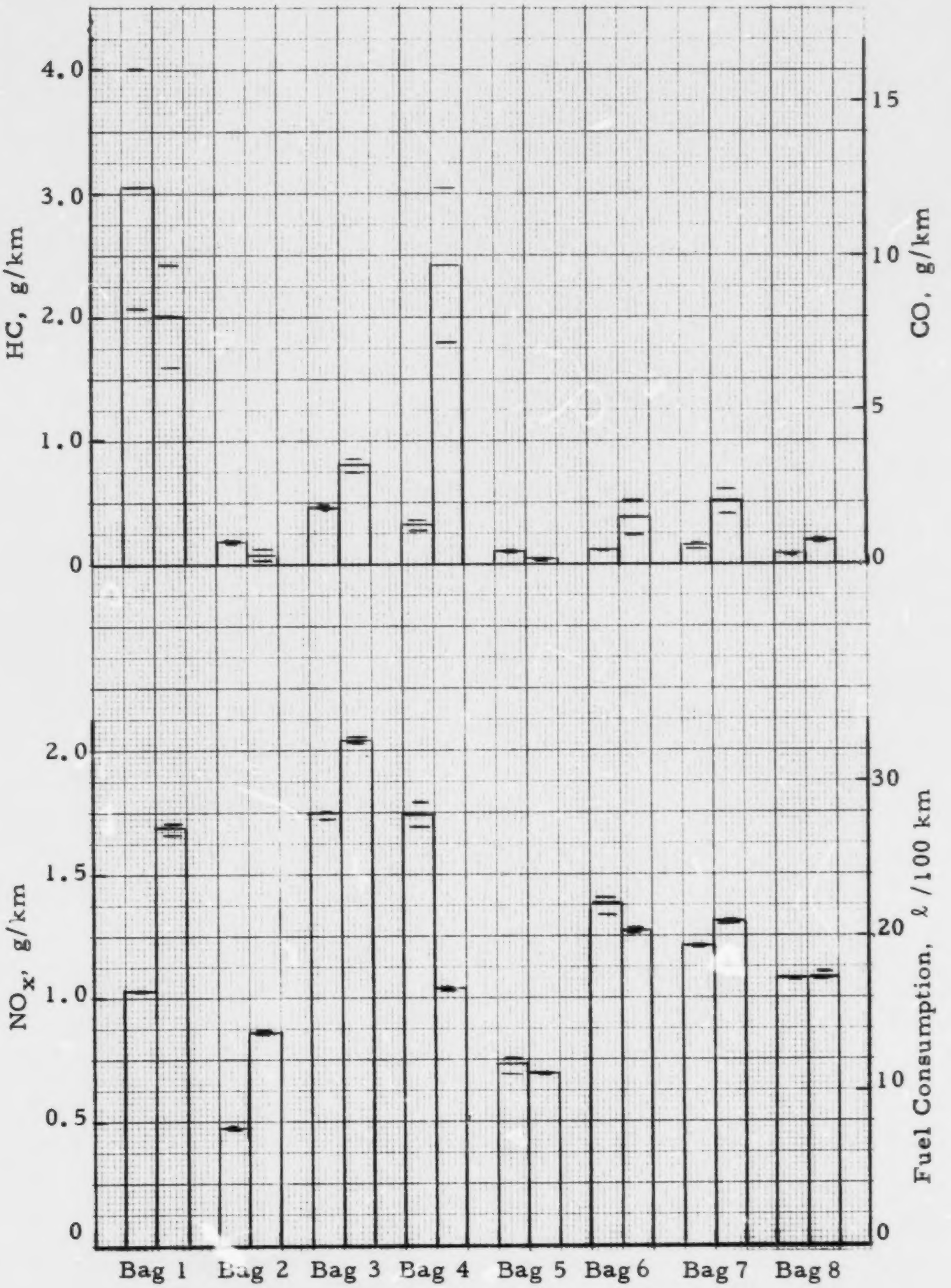

FIGURE A-7. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 20 MINUTE SOAK
1976 Chevrolet Impala

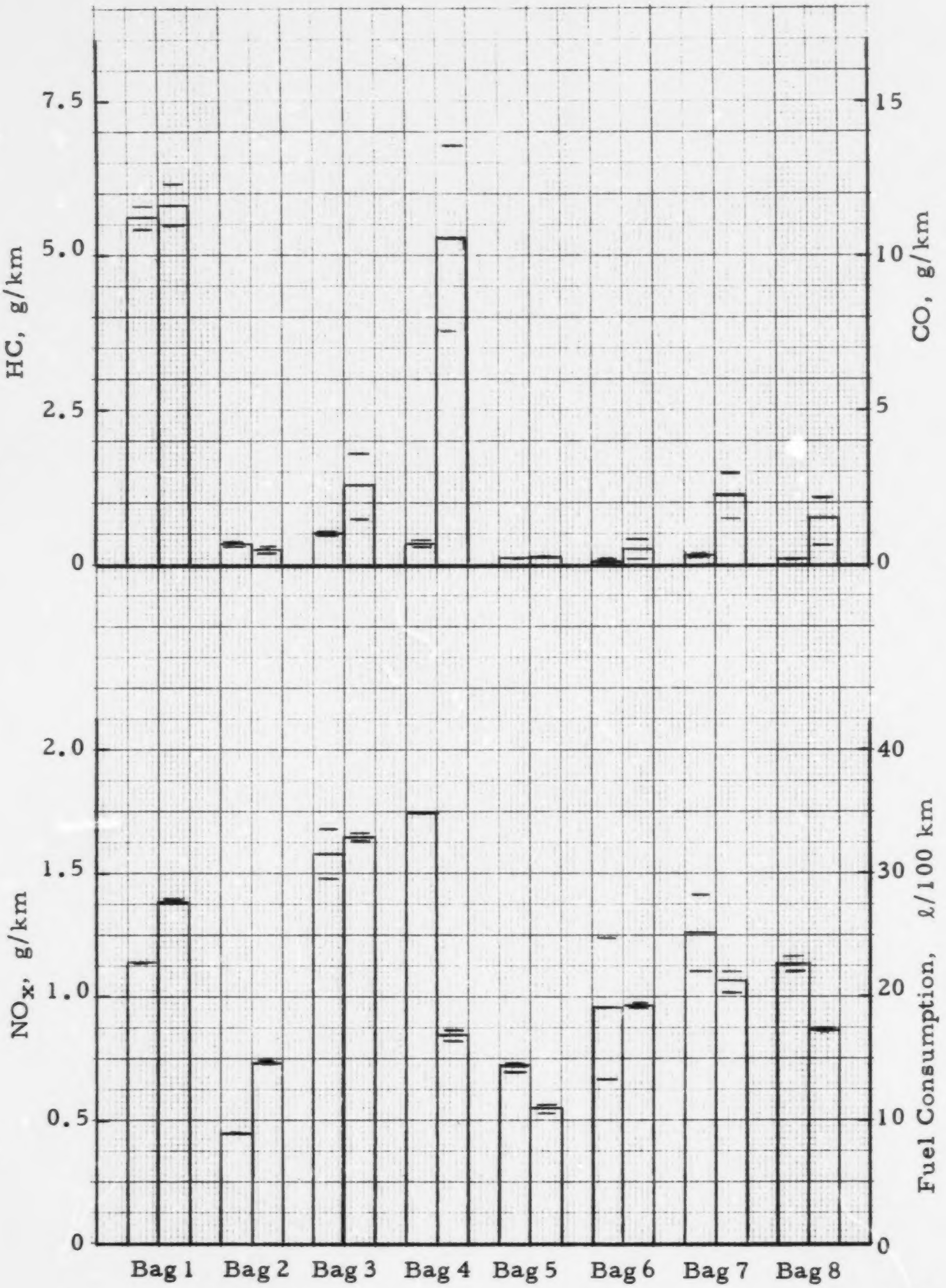

FIGURE A-8. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 30 MINUTE SOAK
1976 Chevrolet Impala

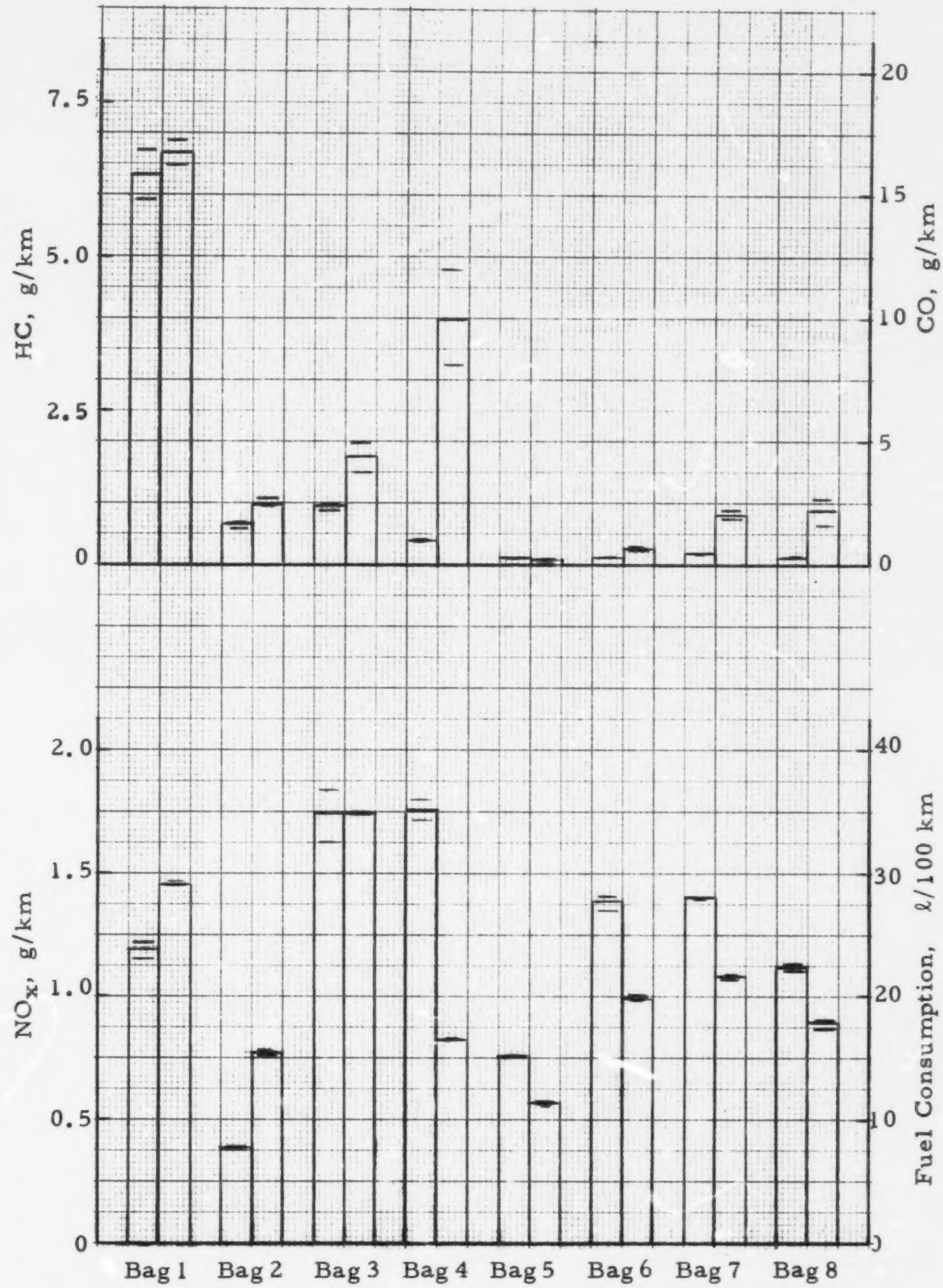

FIGURE A-9. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 1 HR SOAK
1976 Chevrolet Impala

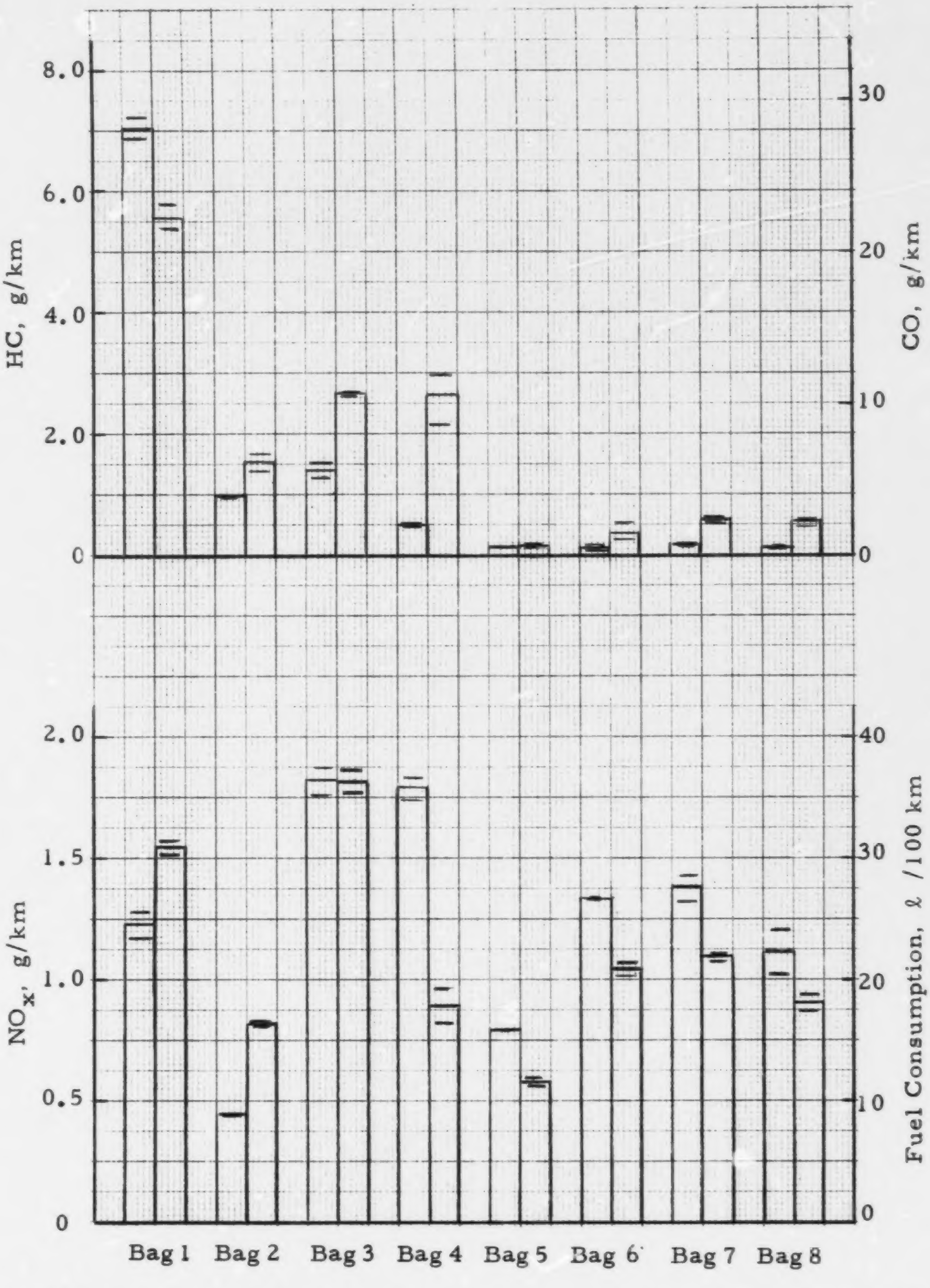

FIGURE A-10. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 2 HR SOAK
1976 Chevrolet Impala

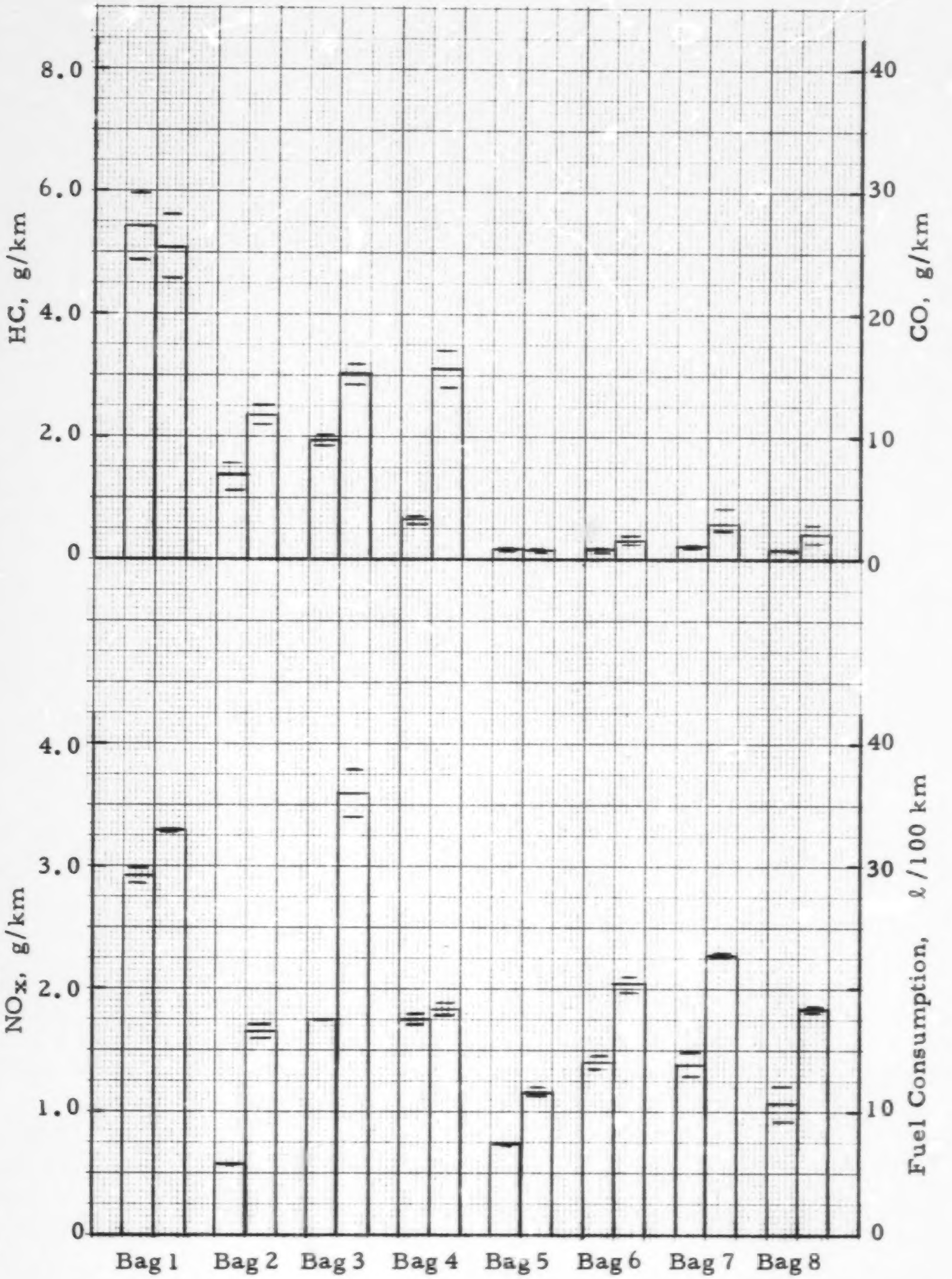

FIGURE A-11. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 4 HR SOAK
1976 Chevrolet Impala

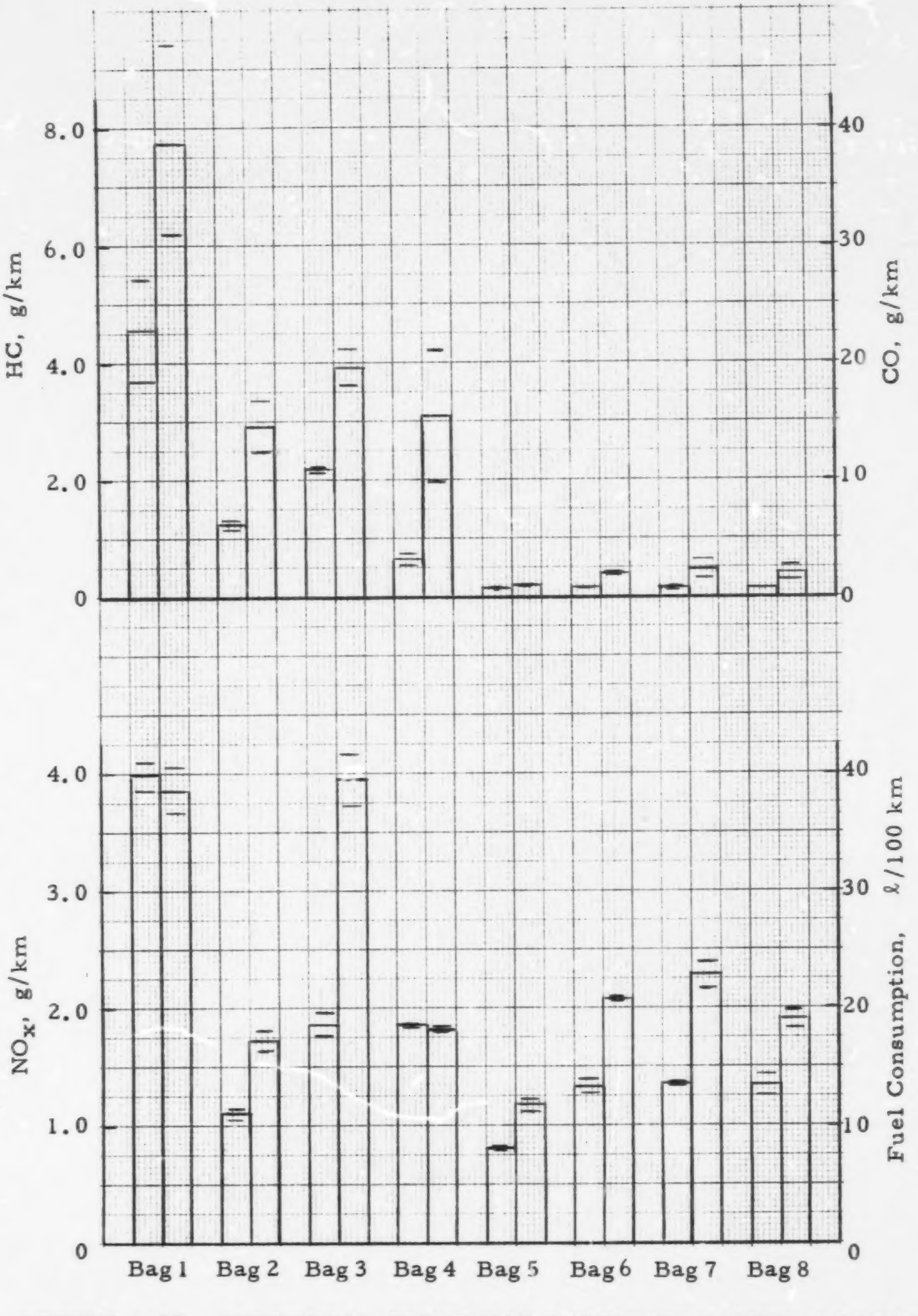

FIGURE A-12. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 8 HR SOAK
1976 Chevrolet Impala

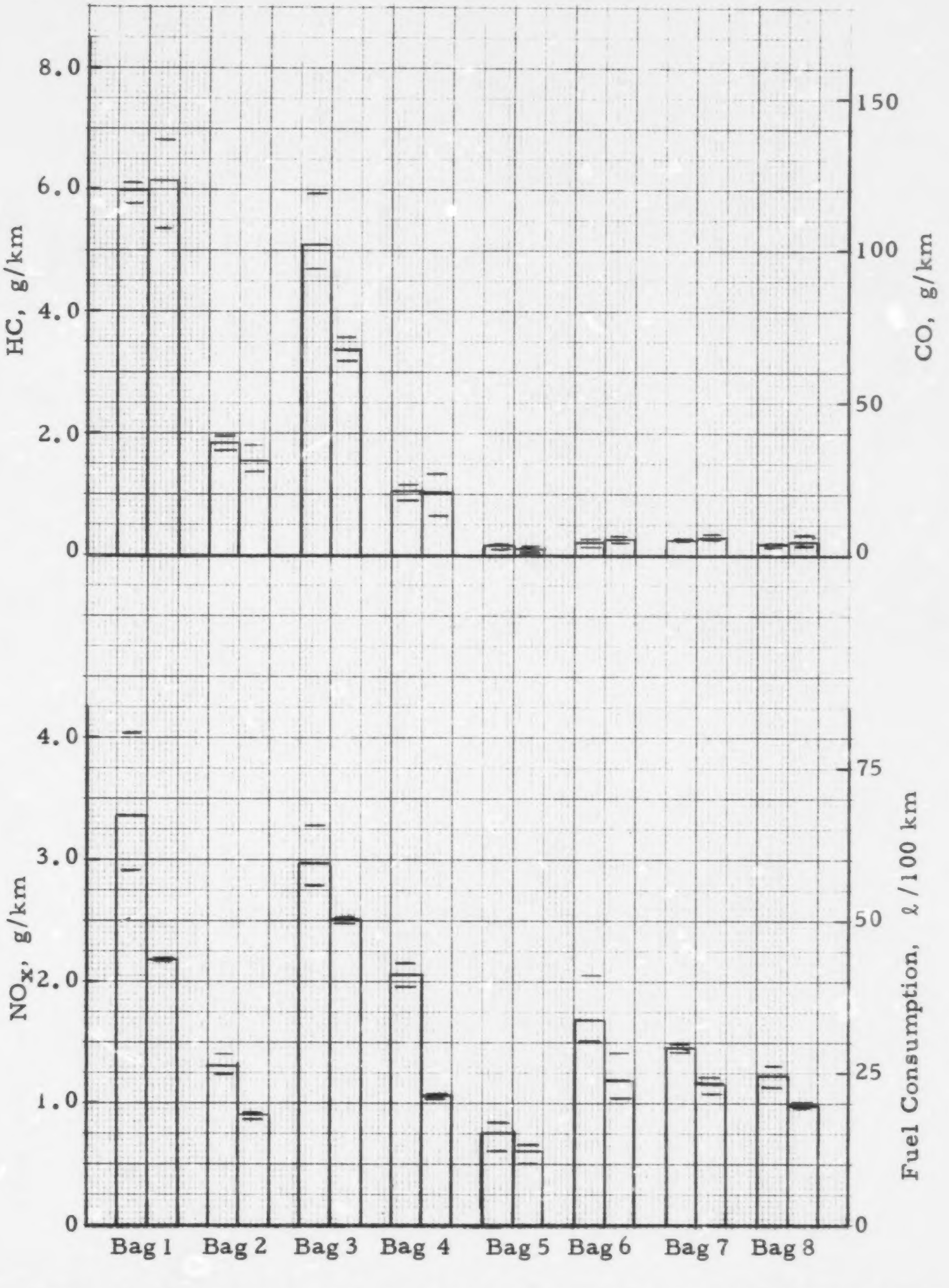

FIGURE A-13. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 16 HR SOAK
1976 Chevrolet Impala

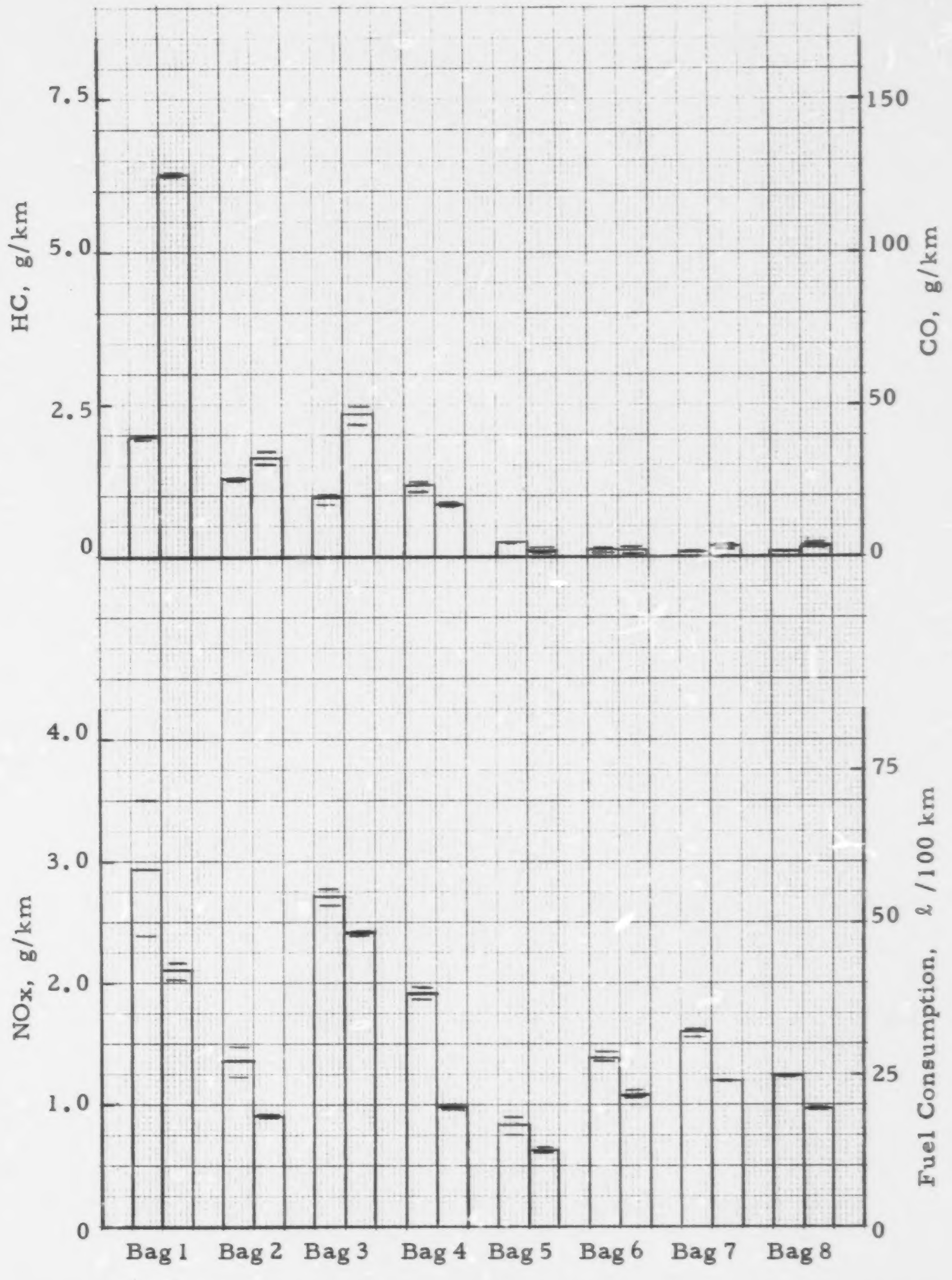

FIGURE A-14. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 36 HR SOAK
1976 Chevrolet Impala

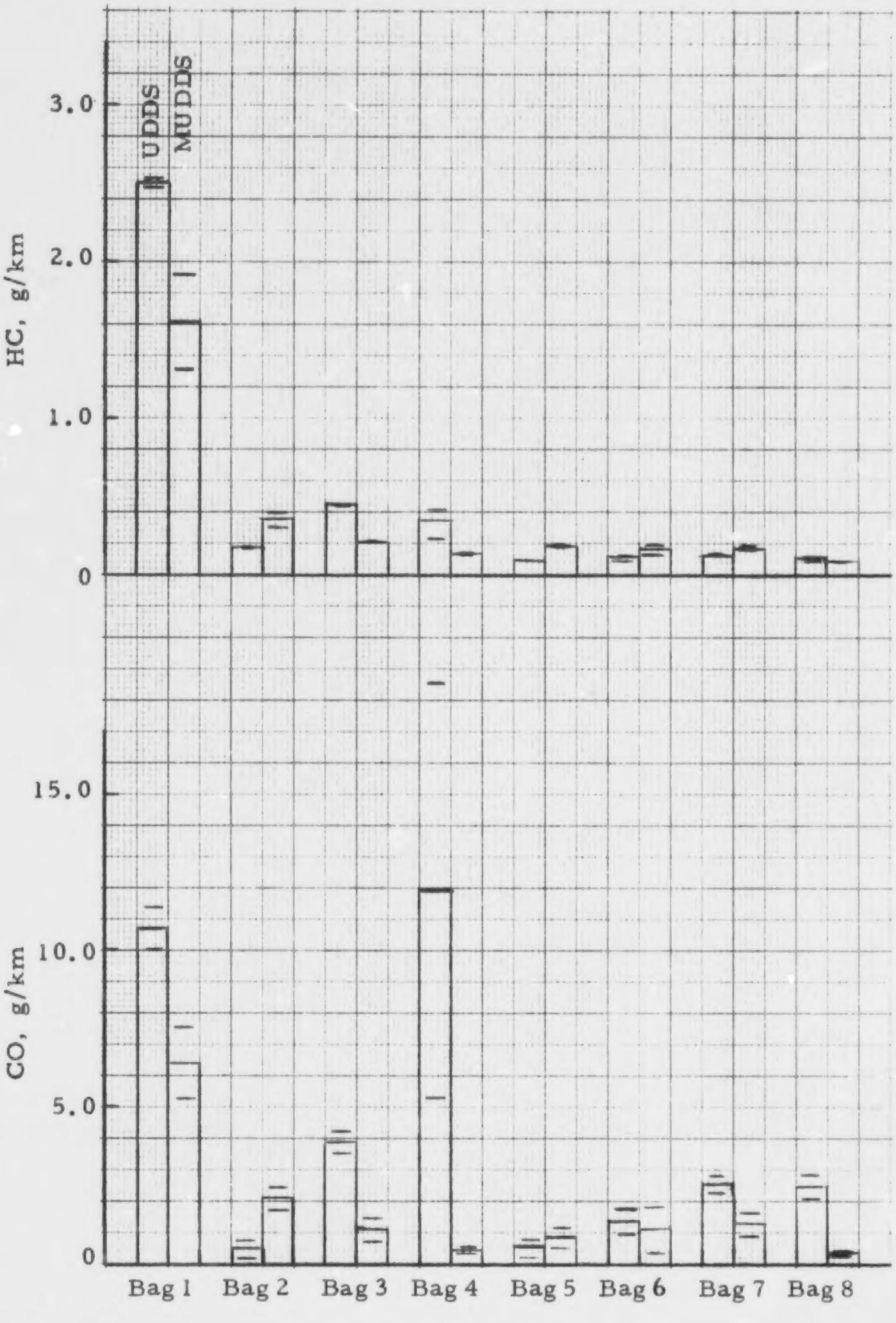

FIGURE A-15. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1976 Chevrolet Impala

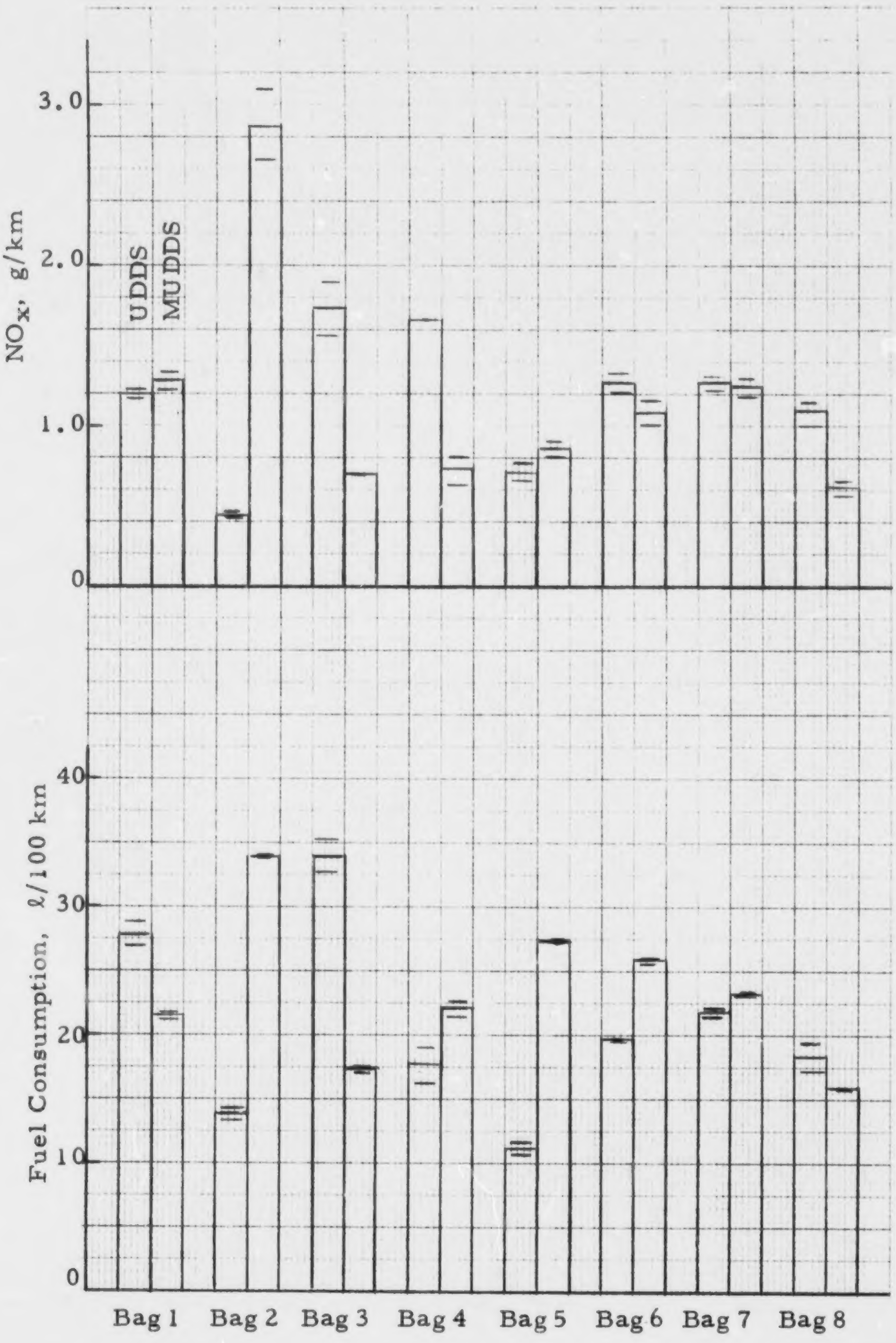

FIGURE A-16. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK 1976 Chevrolet Impala

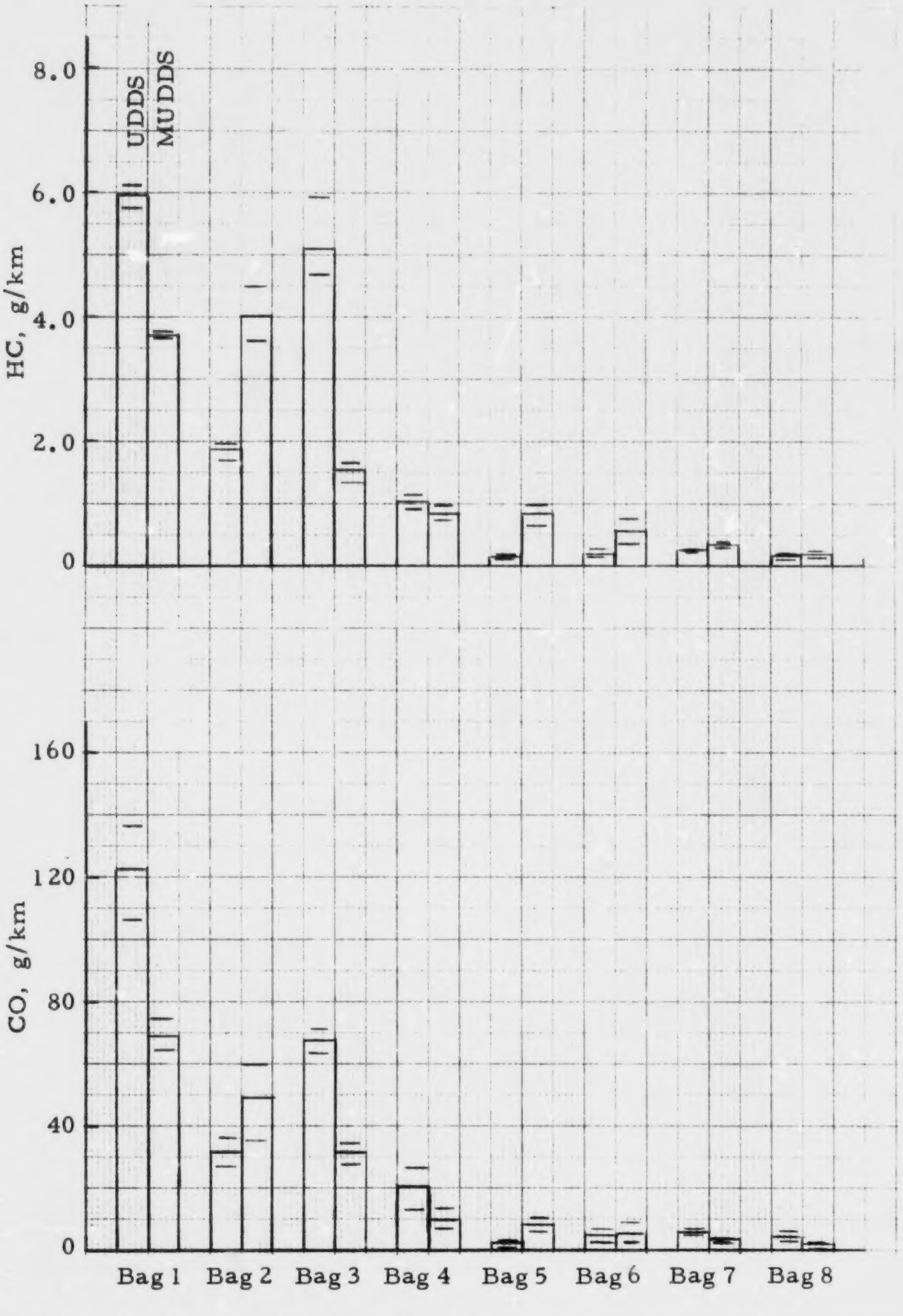

FIGURE A-17. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Chevrolet Impala

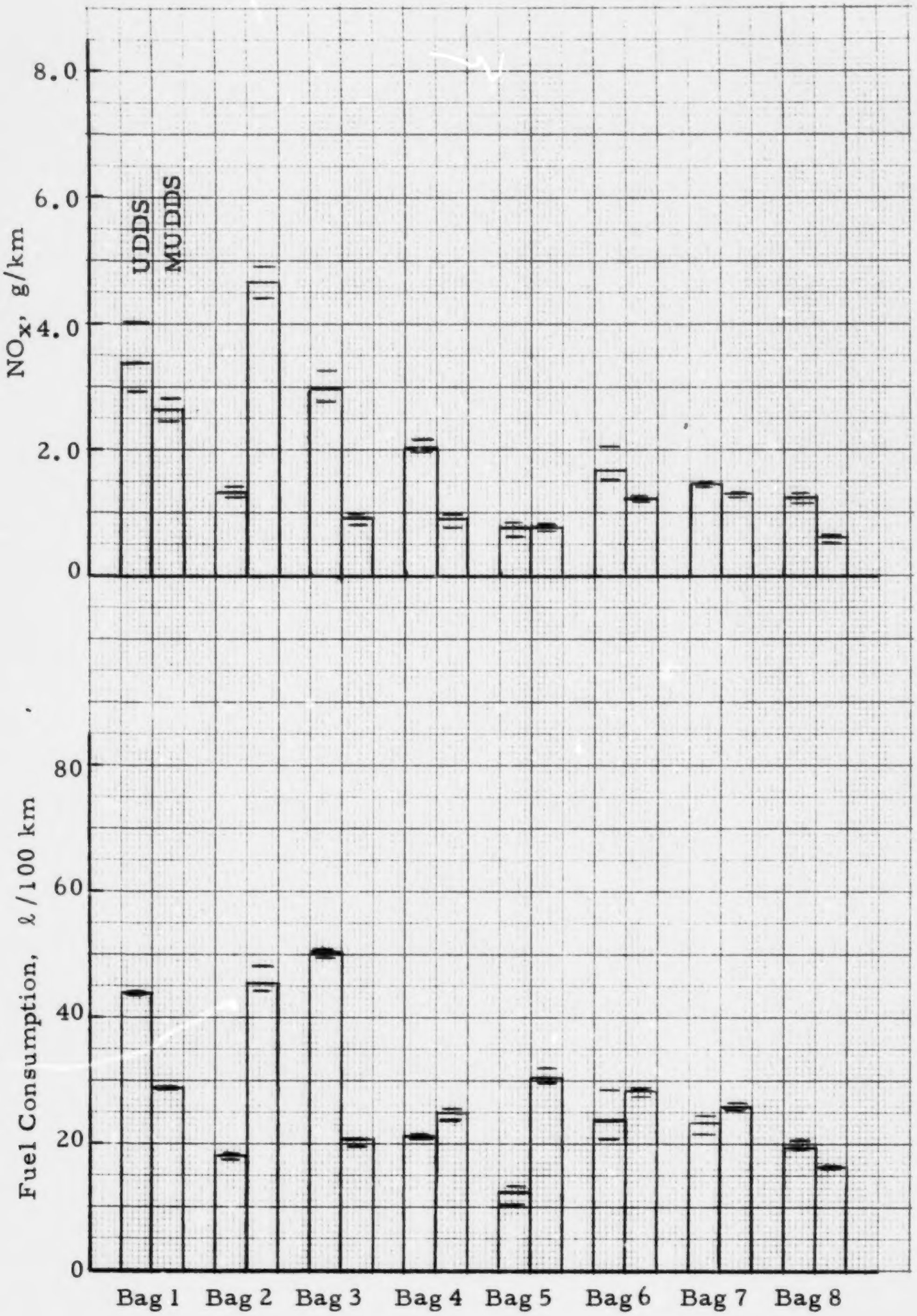

FIGURE A-18. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Chevrolet Impala

APPENDIX B

SUMMARIZED TEST DATA
1977 FORD LTD

TABLE B-1. TEST NUMBERS CORRESPONDING TO DYNAMOMETER TESTS AT EACH CONDITION
1977 Ford LTD

	Replication		
Test Type	1	2	3
UDDS			
10 min soak	10	11	
20 min soak	12	13	
30 min soak	14	15	
1 hr soak	16	17	
2 hr soak	18	19	
4 hr soak	21	28	
8 hr soak	22	23	
16 hr soak	1	2	3
36 hr soak	24	25	
MUDDS			
10 min soak	8	29	
16 hr soak	6	7	30
HFET			
10 min soak	1	2	3
MHFET			
10 min soak	5	26	27

TABLE B-2. EMISSION AND FUEL ECONOMY RESULTS, URBAN DRIVING CYCLES
1977 Ford LTD

			HC, g/km			CO, g/km			NO$_x$ g/km			Fuel Consumption, ℓ/100 km		
Soak Length	Test No.	Date	505(1) sec	867(2) sec	Cycle(3)	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle
						UDDS								
10 min	10	2/22/77	0.22	0.18	0.20	2.61	0.12	1.31	0.86	1.07	0.97	14.19	16.92	15.59
	11	2/22/77	0.25	0.17	0.21	2.25	0.19	1.18	0.86	0.95	0.91	15.25	15.82	15.53
		Average	0.24	0.18	0.21	2.43	0.16	1.25	0.86	1.01	0.94	14.72	16.37	15.56
			(0.39)(4)	(0.29)	(0.34)	(3.91)	(0.26)	(2.01)	(1.38)	(1.63)	(1.51)	(15.98)(5)	(14.37)	(15.12)
20 min	12	2/22/77	0.45	0.19	0.32	0.75	0.08	0.40	0.98	1.06	1.02	15.65	17.82	16.76
	13	2/22/77	0.45	0.17	0.31	2.36	0.22	1.24	0.90	1.02	0.97	15.51	17.41	16.47
		Average	0.45	0.18	0.32	1.56	0.15	0.82	0.94	1.04	1.00	15.58	17.62	16.62
			(0.72)	(0.29)	(0.51)	(2.51)	(0.24)	(1.32)	(1.51)	(1.67)	(1.61)	(15.10)	(13.35)	(14.15)
30 min	14	2/22/77	0.64	0.18	0.40	1.94	0.22	1.04	0.98	1.04	1.01	15.55	18.11	16.86
	15	2/22/77	0.52	0.16	0.33	2.62	0.14	1.33	0.91	1.01	0.96	14.77	16.66	15.73
		Average	0.58	0.17	0.37	2.28	0.19	1.19	0.95	1.03	0.99	15.16	17.39	16.30
			(0.93)	(0.27)	(0.60)	(3.67)	(0.31)	(1.91)	(1.53)	(1.66)	(1.59)	(15.52)	(13.53)	(14.43)
1 hr	16	2/23/77	0.65	0.17	0.40	1.99	0.05	0.98	1.15	1.27	1.22	15.55	17.89	16.74
	17	2/23/77	0.63	0.18	0.39	2.20	0.06	1.08	1.17	1.26	1.22	15.22	18.04	16.66
		Average	0.64	0.18	0.40	2.10	0.06	1.03	1.16	1.27	1.22	15.39	17.97	16.70
			(1.03)	(0.29)	(0.64)	(3.38)	(0.10)	(1.66)	(1.87)	(2.04)	(1.96)	(15.29)	(13.09)	(14.09)
2 hr	18	2/23/77	0.79	0.17	0.47	1.95	0.22	1.05	1.13	1.20	1.17	16.07	17.96	17.03
	19	2/23/77	0.54	0.16	0.34	2.46	0.26	1.31	1.10	1.14	1.12	15.62	17.75	16.70
		Average	0.67	0.17	0.41	2.21	0.24	1.18	1.12	1.17	1.15	15.85	17.86	16.87
			(1.08)	(0.27)	(0.66)	(3.56)	(0.39)	(1.90)	(1.80)	(1.88)	(1.85)	(14.84)	(13.17)	(13.94)
4 hr	21	2/24/77	0.56	0.15	0.34	2.48	0.09	1.23	1.01	1.08	1.05	16.13	17.25	16.69
	28	3/4/77	0.41	0.16	0.28	2.44	0.10	1.22	1.14	1.10	1.12	17.11	16.74	16.90
		Average	0.49	0.16	0.31	2.46	0.10	1.23	1.08	1.09	1.09	16.62	17.00	16.80
			(0.78)	(0.25)	(0.50)	(3.96)	(0.15)	(1.97)	(1.73)	(1.75)	(1.75)	(14.15)	(13.84)	(14.01)
8 hr	22	2/25/77	0.98	0.17	0.56	10.42	0.16	5.07	0.81	1.03	0.92	18.56	18.11	18.29
	23	2/25/77	0.55	0.45	0.50	5.07	2.75	3.87	0.97	1.03	1.00	19.37	17.32	18.27
		Average	0.77	0.31	0.53	7.76	1.46	4.47	0.89	1.03	0.96	18.97	17.72	18.28
			(1.23)	(0.05)	(0.85)	(12.48)	(2.34)	(7.19)	(1.43)	(1.66)	(1.54)	(12.40)	(13.28)	(12.87)
16 hr	1	2/11/77	0.68	0.12	0.39	17.67	0.08	8.51	0.55	0.85	0.70	20.02	17.90	18.87
	2	2/14/77	0.91	0.11	0.50	21.12	0.06	10.14	0.66	0.81	0.74	19.97	17.26	18.50
	3	2/15/77	0.78	0.14	0.45	15.99	0.08	7.70	0.73	0.94	0.84	19.80	16.06	17.81
		Average	0.79	0.12	0.45	18.27	0.07	8.78	0.65	0.87	0.76	19.92	17.07	18.39
			(1.27)	(0.20)	(0.72)	(29.39)	(0.12)	(14.13)	(1.04)	(1.39)	(1.22)	(11.81)	(13.78)	(12.79)
36 hr	24	2/3/77	1.28	0.18	0.70	22.36	0.20	10.81	0.74	1.01	0.88	18.53	16.98	17.68
	25	2/5/77	1.28	0.16	0.70	24.42	0.13	11.76	0.79	1.13	0.97	19.24	17.66	18.37
		Average	1.28	0.17	0.70	23.39	0.17	11.29	0.77	1.07	0.93	18.89	17.32	18.03
			(2.06)	(0.27)	(1.13)	(37.63)	(0.27)	(18.16)	(1.23)	(1.72)	(1.49)	(12.46)	(13.58)	(13.05)
						MUDDS								
10 min	8	2/17/77	0.32	0.15	0.20	1.28	1.42	1.38	1.27	0.89	1.00	20.42	16.06	17.36
	29	3/4/77	0.67	0.15	0.31	1.29	0.73	0.90	1.45	0.96	1.11	19.89	15.63	16.90
		Average	0.50	0.15	0.26	1.29	1.08	1.14	1.36	0.93	1.05	20.16	15.85	17.13
			(0.80)	(0.24)	(0.42)	(2.07)	(1.73)	(1.83)	(2.19)	(1.45)	(1.69)	(11.67)	(14.85)	(13.73)
16 hr	6	2/18/77	1.13	0.14	0.44	25.44	0.71	8.23	0.89	0.79	0.82	23.95	15.66	18.15
	7	2/21/77	1.43	0.14	0.53	29.67	1.15	9.85	0.85	0.80	0.81	24.47	16.66	19.01
	30	3/7/77	1.15	0.14	0.45	22.56	0.47	7.21	0.95	0.95	0.95	23.38	16.17	18.34
		Average	1.24	0.14	0.47	25.89	0.78	8.43	0.90	0.85	0.86	23.94	16.16	18.50
			(1.99)	(0.23)	(0.76)	(41.66)	(1.25)	(13.56)	(1.44)	(1.36)	(1.38)	(9.83)	(14.55)	(12.72)

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(1)First 505 second bag results

(2)Last 867 second bag results

(3)23 minute cycle composite

(4)g/mi

(5)mi/gal

TABLE B-3. EMISSION AND FUEL ECONOMY RESULTS OF HFET AND MODIFIED HFET
1977 Ford LTD

Test Cycle	Test No.	Date Run	HC, g/km	CO, g/km	NO_x, g/km	Fuel Consumption ℓ/100 km
HFET	1	2/11/77	0.09	0.12	0.63	12.25
	2	2/14/77	0.08	0.07	0.67	11.90
	3	2/15/77	0.08	0.04	0.79	11.89
	Average		0.08	0.08	0.70	12.01
			(0.13)(1)	(0.12)(1)	(1.12)(1)	(19.58)(2)
MHFET	5	2/17/77	0.08	0.13	0.86	11.70
	26	3/4/77	0.09	0.07	0.90	11.47
	27	3/4/77	0.10	0.21	0.97	11.50
	Average		0.09	0.14	0.91	11.56
			(0.14)	(0.22)	(1.46)	(20.36)

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(1)g/mi

(2)mi/gal

TABLE B-4. SOAK TEMPERATURE DATA, 1977 FORD LTD

Soak Length	Test No.	Soak Date(s)	Temperature, °C Inlet Air Max	 Min	 Avg	 Water Out Max	 Min	 Avg	 Oil Sump Max	 Min	 Avg	 Fuel Tank Vapor Max	 Min	 Avg	 Fuel Tank Liquid Max	 Min	 Avg
10 min	10	2/22/77	53	38	45	101	91	94	100	92	94	42	40	41	35	33	34
	11	2/22/77	53	37	45	101	91	97	98	91	94	45	44	45	38	37	38
	Overall Average				45			96			94			43			36
20 min	12	2/22/77	59	37	50	101	91	95	98	84	90	47	47	47	42	41	41
	13	2/22/77	58	37	50	101	91	95	98	33	91	49	48	48	44	43	44
	Overall Average				50			95			91			48			43
30 min	14	2/22/77	60	37	51	101	85	92	98	74	86	47	46	47	45	45	45
	15	2/22/77	60	36	52	101	85	93	98	76	86	49	47	47	46	45	45
	Overall Average				52			93			86			47			45
1 hr	16	2/23/77	64	37	57	104	75	90	99	65	80	37	35	36	29	25	28
	17	2/23/77	62	36	56	101	76	89	98	65	79	41	38	39	33	31	33
	Overall Average				57			90			80			38			31
2 hr	18	2/23/77	63	38	58	101	63	79	99	51	69	43	36	39	36	35	36
	19	2/23/77	62	39	58	102	62	79	99	51	69	42	37	39	37	36	37
	Overall Average				58			79			69			39			37
4 hr	21	2/24/77	64	37	54	101	44	66	98	39	55	41	29	32	35	29	32
	28	3/24/77	74	42	58	105	48	70	109	39	59	49	31	35	38	28	35
	Overall Average				56			68			57			34			34
8 hr	22	2/25/77	61	32	43	99	33	51	96	29	44	41	26	29	34	25	29
	23	2/25/77	60	32	44	101	33	50	95	29	43	39	26	29	33	25	28
	Overall Average				44			51			44			29			29
16 hr	1	2/6-2/11/77	62	26	35	99	25	37	97	25	35	42	24	26	36	24	25
	2	2/13-2/14/77	60	26	33	99	26	36	96	25	33	37	24	25	29	23	24
	3	2/14-2/15/77	60	25	35	98	24	38	96	24	34	36	23	26	30	23	25
	Overall Average				34			37			34			26			24
36 hr	24	2/28-3/2/77	61	24	29	99	24	30	96	24	29	38	24	25	31	23	25
	25	3/2-3/4/77	62	23	29	99	24	30	96	24	29	38	24	23	31	22	23
	Overall Average				29			30			29			24			24

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE B-5. TEMPERATURES MEASURED DURING VARIOUS TRANSIENT CYCLES
1977 Ford LTD

Soak Length	Test No.	Date	Temperature, °C Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
									UDDS								
10 min	10	2/22/77	54	37	38	99	87	90	100	91	98	46	42	44	38	35	36
	11	2/22/77	52	37	38	98	86	90	100	90	98	47	45	46	41	38	40
	Overall Average				38			90			98			45			38
20 min	12	2/21/77	58	37	38	96	85	90	99	83	97	48	46	47	43	42	43
	13	2/21/77	57	37	38	95	84	90	99	83	97	49	47	48	45	43	45
	Overall Average				38			90			97			48			44
30 min	14	2/22/77	60	36	37	93	85	90	98	74	95	49	45	47	46	45	46
	15	2/22/77	57	36	37	93	85	91	98	76	95	49	45	46	46	45	45
	Overall Average				37			91			95			47			46
1 hr	16	2/23/77	56	35	36	93	76	90	98	65	93	40	34	36	31	28	30
	17	2/23/77	57	35	38	93	76	90	99	65	94	42	37	39	36	33	35
	Overall Average				37			90			94			38			33
2 hr	18	2/23/77	52	28	37	93	62	88	98	51	89	41	37	38	36	35	36
	19	2/23/77	51	32	37	93	62	88	98	52	89	36	36	38	42	36	36
	Overall Average				37			88			89			38			36
4 hr	20	2/24/77	40	29	34	93	47	85	96	39	83	39	29	33	33	29	31
	21	2/24/77	42	29	35	92	47	85	97	39	84	36	31	33	33	29	31
	Overall Average				35			85			84			33			31
8 hr	22	2/25/77	36	26	32	93	32	82	95	28	77	38	26	31	31	25	28
	23	2/25/77	37	28	34	93	33	79	96	29	80	39	26	32	32	26	29
	Overall Average				33			81			79			32			29
16 hr	1	2/11/77	36	26	31	92	26	80	96	26	76	37	26	31	30	24	27
	2	2/14/77	36	24	31	92	24	80	96	25	75	33	24	28	27	24	25
	3	2/15/77	36	24	29	91	24	80	96	25	75	33	23	28	27	23	25
	Overall Average				30			80			75			29			26
36 hr	24	3/2/77	34	24	31	92	24	79	95	24	74	36	24	29	28	23	26
	25	3/4/77	35	24	31	92	24	79	96	24	73	31	23	27	26	22	24
	Overall Average				31			79			74			28			26
									MUDDS								
10 min	8	2/17/77	54	36	38	102	88	92	102	90	98	43	38	41	33	28	31
	29	3/4/77	52	38	39	98	86	91	98	89	96	39	37	38	36	34	35
	Overall Average				39			92			97			40			33
16 hr	6	2/18/77	34	25	29	92	26	78	97	26	71	34	25	28	28	24	26
	7	2/21/77	35	23	30	92	24	78	98	23	72	33	23	27	27	23	25
	30	3/7/77	35	24	30	92	25	78	97	25	70	30	23	26	27	21	24
	Overall Average				30			78			71			27			25
									HFET								
10 min	1	2/11/77	50	38	39	97	85	92	106	88	101	46	39	41	35	32	34
	2	2/14/77	49	37	38	96	86	92	107	88	101	41	36	37	31	28	29
	4	2/16/77	50	37	39	99	87	92	108	89	101	43	37	39	31	28	30
	Overall Average				39			92			101			39			31
									MHFET								
10 min	5	2/17/77	58	38	41	104	89	92	109	92	104	49	45	46	38	35	37
	26	3/4/77	47	36	38	97	85	92	109	86	101	41	33	37	31	27	29
	27	3/4/77	63	39	42	108	90	92	110	99	105	48	42	45	36	32	34
	Overall Average				40			92			103			43			33

Max and min from trace, average by integrator
Overall average is average for all replications

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TABLE B-6. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 10 MINUTE SOAK

1977 Ford LTD

TEST NO. 10

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CU G/ TEST	CU G/ MIN.	CU G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	.59	.56	1.69	1.08	1.03	3.09	193.7	184.2	553.5	.50	.48	1.43	23.79
2	.12	.12	.17	0.00	0.00	0.00	198.4	191.1	275.6	.51	.49	.71	11.72
3	.14	.13	.58	.07	.07	.29	176.9	167.9	736.9	.56	.53	2.33	31.38
4	.25	.24	.18	11.75	11.19	8.58	489.8	466.5	357.5	1.17	1.11	.85	15.89
5	.10	.09	.07	.07	.07	.05	296.1	280.7	211.5	.53	.50	.38	9.04
6	.08	.08	.15	.18	.17	.33	226.1	215.0	411.1	.72	.68	1.31	17.69
7	.07	.07	.17	.03	.03	.07	179.5	170.4	427.3	.56	.53	1.33	18.34
8	.10	.09	.14	.07	.07	.10	245.8	229.4	341.4	.56	.52	.78	14.52
EIGHT BAG TOTAL	1.45			13.25			2006.4			5.11			
505 SEC BAG MASS	1.25			15.10			1890.4			4.96			
PERCENT DIFFERENCE	-16.00			12.25			-6.11			-3.02			

TEST NO. 11

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	.65	.63	1.86	1.37	1.32	3.91	213.0	205.1	608.5	.57	.55	1.63	26.19
2	.14	.13	.19	0.00	0.00	0.00	204.3	194.3	283.8	.47	.45	.65	12.07
3	.14	.13	.58	.14	.13	.58	187.3	180.1	780.2	.51	.49	2.13	33.24
4	.22	.21	.16	9.98	9.40	7.28	460.3	433.5	336.0	1.04	.98	.76	14.88
5	.11	.11	.08	.06	.06	.04	306.3	292.6	218.8	.56	.54	.40	9.35
6	.10	.10	.18	.05	.05	.09	285.6	271.5	519.2	.93	.88	1.69	22.32
7	.08	.08	.19	.14	.13	.33	192.4	182.1	458.2	.49	.46	1.17	19.69
8	.09	.08	.13	.05	.05	.07	248.8	230.4	345.6	.64	.59	.89	14.69
EIGHT BAG TOTAL	1.53			11.79			2097.9			5.21			
505 SEC BAG MASS	1.45			13.00			2030.1			4.96			
PERCENT DIFFERENCE	-5.52			9.31			-2.94			-5.04			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-7. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 20 MINUTE SOAK
1977 Ford LTD

TEST NO. 12

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.83	1.71	5.23	3.50	3.28	10.00	205.4	192.3	586.8	.58	.54	1.66	26.13
2	.15	.15	.21	.02	.02	.03	190.7	184.9	264.9	.40	.39	.56	11.20
3	.16	.15	.67	.02	.02	.08	186.0	176.3	775.1	.56	.53	2.33	33.00
4	.20	.19	.15	.15	.14	.11	472.2	451.9	344.7	1.46	1.40	1.07	14.77
5	.13	.12	.09	.04	.04	.03	316.1	301.5	225.8	.59	.56	.42	9.65
6	.09	.09	.16	.08	.08	.15	236.3	226.1	429.6	.79	.76	1.44	18.47
7	.09	.08	.21	.01	.01	.02	189.5	177.6	451.1	.60	.56	1.43	19.37
8	.10	.09	.14	.32	.30	.44	265.5	245.4	368.7	.65	.60	.90	15.70
EIGHT BAG TOTAL	2.75			4.14			2061.7			5.63			
505 SEC BAG MASS	2.60			4.32			2101.9			5.64			
PERCENT DIFFERENCE	-5.77			4.17			1.91			.18			

TEST NO. 13

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.89	1.79	5.40	4.10	3.89	11.71	202.4	191.8	578.2	.65	.62	1.86	25.91
2	.17	.16	.24	.02	.02	.03	200.6	191.3	278.6	.51	.49	.71	11.86
3	.14	.13	.58	.03	.03	.13	185.4	175.4	772.3	.56	.53	2.33	32.87
4	.20	.19	.15	5.76	5.54	4.20	470.1	452.0	343.1	1.16	1.12	.85	14.98
5	.12	.11	.09	.05	.05	.04	313.0	299.8	223.6	.60	.57	.43	9.56
6	.09	.09	.16	.05	.05	.09	226.4	216.0	411.7	.72	.69	1.31	17.70
7	.08	.08	.19	.50	.48	1.19	194.4	185.5	462.9	.50	.48	1.19	19.95
8	.11	.10	.15	3.08	2.87	4.28	266.5	247.9	370.1	.55	.51	.76	16.02
EIGHT BAG TOTAL	2.80			13.59			2058.8			5.25			
505 SEC BAG MASS	2.61			13.62			2068.1			5.22			
PERCENT DIFFERENCE	-7.28			.22			.45			-.57			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-8. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 30 MINUTE SOAK
1977 Ford LTD

TEST NO. 14

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.66	2.56	7.60	3.94	3.79	11.26	196.0	188.5	560.1	.82	.79	2.34	25.41
2	.22	.21	.31	.05	.05	.07	198.2	184.9	275.2	.56	.52	.78	11.73
3	.38	.37	1.58	.03	.03	.13	173.8	170.4	724.1	.53	.52	2.21	30.96
4	.21	.20	.15	6.21	5.86	4.53	485.0	457.5	354.0	1.19	1.12	.87	15.46
5	.12	.11	.09	.06	.06	.04	311.5	297.1	222.5	.62	.59	.44	9.51
6	.08	.08	.15	.05	.05	.09	225.4	214.7	409.8	.69	.66	1.25	17.62
7	.07	.07	.17	.02	.02	.05	191.2	179.9	455.4	.59	.55	1.40	19.54
8	.09	.09	.13	.09	.09	.13	261.3	246.9	362.9	.64	.60	.89	15.43
EIGHT BAG TOTAL	3.83			10.45			2042.4			5.64			
505 SEC BAG MASS	3.72			11.19			2073.9			5.69			
PERCENT DIFFERENCE	-2.96			6.61			1.52			.88			

TEST NO. 15

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.39	2.28	6.83	4.49	4.29	12.83	201.6	192.6	576.0	.79	.75	2.26	26.08
2	.20	.19	.28	.03	.03	.04	198.5	188.1	275.6	.50	.47	.69	11.74
3	.16	.15	.67	.08	.08	.33	184.3	177.5	768.0	.52	.50	2.17	32.72
4	.23	.22	.17	5.32	5.09	3.88	465.5	445.5	339.8	1.17	1.12	.85	14.81
5	.12	.11	.09	.04	.04	.03	317.7	298.7	226.9	.59	.55	.42	9.70
6	.09	.09	.16	.13	.12	.24	234.7	223.9	426.7	.69	.66	1.25	18.35
7	.11	.11	.26	4.67	4.46	11.12	195.6	186.9	465.8	.44	.42	1.05	20.75
8	.08	.07	.11	.14	.13	.19	253.6	237.3	352.2	.60	.56	.83	14.98
EIGHT BAG TOTAL	3.38			14.90			2051.4			5.30			
505 SEC BAG MASS	2.99			15.11			1963.7			5.24			
PERCENT DIFFERENCE	-13.04			1.39			-4.47			-1.15			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-9. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 1 HR SOAK
1977 Ford LTD

TEST NO. 16

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.76	2.60	7.89	2.76	2.60	7.89	191.9	181.0	548.1	.91	.86	2.60	24.72
2	.27	.26	.38	.04	.04	.06	202.7	194.0	281.6	.74	.71	1.03	12.01
3	.21	.20	.87	.06	.06	.25	178.8	170.8	744.9	.61	.58	2.54	31.75
4	.28	.27	.20	7.84	7.53	5.72	492.1	472.5	359.2	1.50	1.44	1.09	15.77
5	.13	.12	.09	.05	.05	.04	313.5	292.0	223.9	.68	.63	.49	9.57
6	.09	.09	.16	.03	.03	.05	220.9	213.8	401.6	.81	.78	1.47	17.26
7	.08	.08	.19	.02	.02	.05	185.8	175.5	442.3	.61	.58	1.45	18.99
8	.09	.08	.13	.03	.03	.04	241.6	225.9	335.5	.69	.64	.96	14.26
EIGHT BAG TOTAL	3.91			10.83			2027.1			6.55			
505 SEC BAG MASS	3.78			11.50			2072.6			6.67			
PERCENT DIFFERENCE	-3.44			5.83			2.19			1.80			

TEST NO. 17

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.70	2.60	7.71	3.98	3.83	11.37	178.1	171.3	508.9	.97	.93	2.77	23.27
2	.22	.21	.31	.07	.07	.10	199.8	189.1	277.5	.72	.68	1.00	11.83
3	.19	.18	.79	.02	.02	.08	166.5	158.6	693.9	.61	.58	2.54	29.58
4	.26	.25	.19	7.69	7.32	5.61	485.2	462.1	354.2	1.66	1.58	1.21	15.55
5	.12	.11	.09	.05	.05	.04	296.9	284.1	212.1	.70	.67	.50	9.07
6	.09	.09	.16	.03	.03	.05	219.1	208.6	398.3	.84	.80	1.53	17.12
7	.07	.07	.17	.17	.16	.40	182.2	171.9	433.8	.58	.55	1.38	18.64
8	.09	.08	.13	.05	.05	.07	235.2	220.5	326.7	.66	.62	.92	13.89
EIGHT BAG TOTAL	3.74			12.06			1963.0			6.74			
505 SEC BAG MASS	3.61			12.71			2026.8			6.78			
PERCENT DIFFERENCE	-3.60			5.11			3.15			.59			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-10. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 2 HR SOAK
1977 Ford LTD

TEST NO. 18

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.43	3.27	9.80	3.29	3.14	9.40	188.5	179.8	538.7	.94	.90	2.69	24.68
2	.28	.26	.39	.07	.07	.10	209.7	197.8	291.2	.71	.67	.99	12.42
3	.20	.19	.83	.01	.01	.04	168.8	163.3	703.2	.58	.56	2.42	29.97
4	.32	.31	.23	7.16	6.83	5.23	502.3	479.1	366.6	1.56	1.49	1.14	16.06
5	.13	.12	.09	.04	.04	.03	312.7	292.2	223.3	.72	.67	.51	9.55
6	.08	.08	.15	.02	.02	.04	223.6	215.6	406.5	.77	.74	1.40	17.47
7	.07	.07	.17	.07	.07	.17	191.5	181.8	456.0	.56	.55	1.38	19.50
8	.08	.07	.11	.06	.06	.08	244.1	228.1	339.0	.62	.58	.86	14.41
EIGHT BAG TOTAL	4.59			10.72			2041.1			6.48			
505 SEC BAG MASS	4.54			11.24			2141.8			6.54			
PERCENT DIFFERENCE	-1.10			4.63			4.70			.92			

TEST NO. 19

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.31	2.19	6.60	5.04	4.77	14.40	213.4	201.9	609.6	.92	.87	2.63	27.57
2	.19	.18	.26	.04	.04	.06	204.0	190.7	283.4	.71	.66	.99	12.07
3	.16	.15	.67	.04	.04	.17	169.9	163.1	708.0	.59	.57	2.46	30.16
4	.26	.25	.19	8.35	8.03	6.09	478.6	460.2	349.4	1.55	1.49	1.13	15.38
5	.11	.10	.08	.06	.06	.04	299.5	280.8	213.9	.69	.65	.49	9.15
6	.08	.08	.15	.04	.04	.07	214.2	206.6	389.5	.77	.74	1.40	16.74
7	.06	.06	.14	.05	.05	.12	171.6	163.4	408.6	.52	.50	1.24	17.54
8	.08	.07	.11	.38	.35	.53	244.7	226.2	339.8	.61	.56	.85	14.48
EIGHT BAG TOTAL	3.25			14.00			1996.0			6.36			
505 SEC BAG MASS	3.14			14.20			2079.7			6.33			
PERCENT DIFFERENCE	-3.50			1.41			4.02			-.47			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-11. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 4 HR SOAK

1977 Ford LTD

TEST NO. 21

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.13	2.05	6.09	7.25	6.99	20.71	216.2	208.6	617.9	.81	.78	2.31	28.27
2	.19	.18	.26	.10	.09	.14	218.9	206.5	304.1	.57	.54	.79	12.95
3	.29	.29	1.21	.02	.02	.08	175.1	168.9	729.7	.44	.42	1.83	31.15
4	.24	.23	.18	6.06	5.76	4.42	515.2	489.9	376.0	1.38	1.31	1.01	16.40
5	.12	.11	.09	.04	.04	.03	306.1	291.5	218.6	.68	.65	.49	9.35
6	.08	.08	.15	.04	.04	.07	230.3	218.6	418.7	.73	.69	1.33	17.99
7	.07	.07	.17	.04	.04	.10	191.2	182.7	455.2	.51	.49	1.21	19.54
8	.09	.08	.13	.07	.06	.10	254.0	235.5	352.7	.61	.57	.85	15.00
EIGHT BAG TOTAL	3.21			13.62			2107.0			5.73			
505 SEC BAG MASS	3.21			14.32			2148.3			5.84			
PERCENT DIFFERENCE	.00			4.89			1.92			1.88			

TEST NO. 28

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.43	1.35	4.09	6.30	5.96	18.00	322.4	305.1	921.1	1.52	1.44	4.34	40.63
2	.15	.14	.21	.04	.04	.06	201.7	193.6	280.1	.51	.49	.71	11.92
3	.13	.12	.54	.04	.04	.17	169.4	161.4	706.0	.46	.44	1.92	30.05
4	.20	.19	.15	6.01	5.74	4.39	482.5	461.0	352.2	1.23	1.18	.90	15.38
5	.12	.11	.09	.05	.05	.04	317.7	301.1	226.9	.65	.62	.46	9.70
6	.08	.08	.15	.04	.04	.07	226.7	215.9	412.1	.71	.68	1.29	17.71
7	.07	.07	.17	.05	.05	.12	191.4	181.5	455.8	.51	.48	1.21	19.57
8	.07	.07	.10	.24	.23	.33	233.3	219.0	324.0	.55	.52	.76	13.79
EIGHT BAG TOTAL	2.25			12.77			2145.1			6.14			
505 SEC BAG MASS	2.37			14.10			2284.9			6.56			
PERCENT DIFFERENCE	5.06			9.43			6.12			6.40			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-12. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 8 HR SOAK

1977 Ford LTD

TEST NO. 22

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	4.93	4.71	14.09	51.44	49.15	146.97	287.8	274.9	822.2	.34	.32	.97	46.34
2	.14	.13	.19	.03	.03	.04	242.3	228.9	336.5	.30	.28	.42	14.31
3	.19	.18	.79	.09	.09	.37	197.3	191.5	822.0	.30	.29	1.25	35.03
4	.27	.26	.20	10.96	10.39	8.00	567.6	538.0	414.3	1.44	1.36	1.05	18.28
5	.12	.11	.09	.03	.03	.02	328.9	312.2	234.9	.56	.53	.40	10.04
6	.11	.10	.20	.51	.48	.93	252.3	239.1	458.7	.49	.46	.89	19.78
7	.06	.06	.14	.12	.12	.29	191.4	184.1	455.8	.41	.39	.98	19.57
8	.10	.09	.14	.03	.03	.04	269.8	250.6	374.7	.57	.53	.79	15.93
EIGHT BAG TOTAL	5.92			63.21			2337.4			4.41			
505 SEC BAG MASS	5.69			60.18			2398.0			4.67			
PERCENT DIFFERENCE	-4.04			-5.03			2.53			5.57			

TEST NO. 23

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.38	2.29	6.80	22.09	21.27	63.11	363.6	350.2	1039.0	.51	.49	1.46	48.96
2	.27	.24	.38	.03	.03	.04	405.4	359.8	563.1	1.16	1.03	1.61	23.96
3	.22	.23	.92	.99	1.02	4.12	297.7	305.8	1240.3	.95	.98	3.96	53.05
4	.16	.15	.12	7.45	7.15	5.44	547.8	525.9	399.8	.97	.93	.71	17.48
5	.09	.09	.06	.06	.06	.04	326.1	310.5	232.9	.53	.50	.38	9.96
6	.09	.08	.15	.29	.27	.53	225.8	212.7	410.5	.62	.58	1.13	17.67
7	.07	.07	.17	.12	.11	.29	190.9	182.1	454.6	.45	.43	1.07	19.52
8	.08	.07	.11	.09	.08	.13	250.1	232.3	347.3	.55	.51	.76	14.77
EIGHT BAG TOTAL	3.35			31.12			2607.4			5.74			
505 SEC BAG MASS	3.20			29.38			2563.4			5.58			
PERCENT DIFFERENCE	-4.69			-5.92			-1.71			-2.87			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-13. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 16 HR SOAK

1977 Ford LTD

TEST NO. 1

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.27	3.13	9.34	86.71	82.98	247.74	319.1	305.4	911.8	.19	.18	.54	56.17
2	.14	.13	.19	.29	.27	.40	272.3	254.9	378.2	.20	.19	.28	16.11
3	.12	.12	.50	1.00	.98	4.17	211.1	207.0	879.7	.25	.25	1.04	37.70
4	.26	.25	.19	18.98	18.05	13.85	629.6	598.6	459.5	.80	.76	.58	20.61
5	.10	.09	.07	.26	.25	.19	377.0	356.8	269.3	.34	.32	.24	11.52
6	.07	.07	.13	0.00	0.00	0.00	267.6	253.6	486.5	.45	.43	.82	20.90
7	.06	.06	.14	0.00	0.00	0.00	209.8	199.5	499.5	.43	.41	1.02	21.42
8	.09	.08	.13	.20	.19	.28	291.0	272.4	404.1	.44	.41	.61	17.19
EIGHT BAG TOTAL	4.11			107.44			2577.5			3.10			
505 SEC BAG MASS	3.92			102.20			2534.4			3.16			
PERCENT DIFFERENCE	-4.85			-5.13			-1.70			1.90			

TEST NO. 2

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	5.27	5.06	15.06	139.40	133.82	398.29	296.9	285.0	848.2	.12	.12	.34	64.23
2	.18	.17	.25	.83	.79	1.15	275.4	262.3	382.5	.18	.17	.25	16.35
3	.12	.12	.50	.22	.21	.92	204.9	196.4	853.7	.24	.23	1.00	36.37
4	.20	.19	.15	4.18	3.94	3.05	559.1	526.6	408.1	.97	.91	.71	17.68
5	.09	.08	.06	0.00	0.00	0.00	355.7	334.5	254.1	.51	.48	.36	10.86
6	.06	.06	.11	0.00	0.00	0.00	235.6	224.3	428.3	.49	.47	.89	18.39
7	.06	.06	.14	0.00	0.00	0.00	189.1	181.5	450.1	.37	.36	.88	19.30
8	.07	.07	.10	.05	.05	.07	253.3	239.0	351.8	.41	.39	.57	14.95
EIGHT BAG TOTAL	6.05			144.68			2369.9			3.29			
505 SEC BAG MASS	5.27			121.98			2488.2			3.83			
PERCENT DIFFERENCE	-14.80			-18.61			4.76			14.10			

TEST NO. 3

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.93	3.76	11.23	93.15	89.14	266.14	316.0	302.4	902.9	.18	.17	.51	57.27
2	.14	.13	.19	.27	.26	.38	281.5	266.4	390.9	.23	.22	.32	16.65
3	.12	.12	.50	.51	.49	2.13	218.3	210.6	909.5	.28	.27	1.17	38.82
4	.21	.20	.15	8.31	7.90	6.07	607.1	577.3	443.2	1.11	1.06	.81	19.38
5	.10	.09	.07	.14	.13	.10	361.5	342.7	258.2	.53	.50	.38	11.04
6	.08	.08	.15	.11	.10	.20	260.0	247.6	472.7	.57	.54	1.04	20.32
7	.07	.07	.17	.11	.10	.26	206.0	196.2	490.5	.42	.40	1.00	21.06
8	.08	.07	.11	.14	.13	.19	277.6	259.4	385.6	.46	.43	.64	16.90
EIGHT BAG TOTAL	4.73			102.74			2520.0			3.78			
505 SEC BAG MASS	4.51			92.39			2518.8			4.23			
PERCENT DIFFERENCE	-4.88			-11.20			-.37			10.64			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-14. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 36 HR SOAK
1977 Ford LTD

TEST NO. 24

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	6.17	5.89	17.63	112.82	107.79	322.34	221.6	211.7	633.1	.33	.32	.94	50.46
2	.22	.21	.31	.66	.63	.92	253.9	241.1	352.7	.32	.30	.44	15.07
3	.17	.16	.71	.22	.21	.92	217.9	207.8	907.9	.27	.26	1.12	38.70
4	.32	.31	.23	18.67	17.98	13.63	515.6	496.5	376.3	.86	.83	.63	17.04
5	.12	.11	.09	5.88	5.55	4.20	349.8	330.0	249.8	.53	.50	.38	10.96
6	.09	.09	.16	.11	.10	.20	242.5	229.8	440.8	.59	.56	1.07	18.96
7	.08	.08	.19	.11	.10	.26	195.4	186.3	465.1	.45	.43	1.07	19.98
8	.10	.09	.14	.18	.17	.25	253.5	234.4	352.1	.51	.47	.71	14.98
EIGHT BAG TOTAL	7.27			138.65			2250.0			3.86			
505 SEC BAG MASS	7.37			129.19			2279.2			4.27			
PERCENT DIFFERENCE	1.36			-7.32			1.28			9.60			

TEST NO. 25

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	5.86	5.59	16.74	122.63	116.98	350.37	206.0	196.5	588.6	.24	.23	.69	50.32
2	.25	.24	.35	2.05	1.96	2.85	257.5	246.4	357.6	.27	.26	.38	15.42
3	.18	.17	.75	1.56	1.48	6.50	202.8	192.5	844.8	.26	.25	1.08	36.40
4	.22	.21	.16	11.63	11.04	8.49	538.3	511.1	392.9	1.03	.98	.75	17.40
5	.10	.10	.07	.04	.04	.03	327.2	311.1	233.7	.54	.51	.39	9.99
6	.08	.08	.15	.03	.03	.05	238.8	227.8	434.1	.64	.61	1.16	18.65
7	.06	.06	.14	.02	.02	.05	184.6	176.3	439.5	.48	.46	1.14	18.86
8	.08	.07	.11	.04	.04	.06	247.2	228.5	343.3	.60	.55	.83	14.59
EIGHT BAG TOTAL	6.83			138.00			2202.3			4.06			
505 SEC BAG MASS	7.38			141.07			2357.2			4.54			
PERCENT DIFFERENCE	7.45			2.18			6.58			10.57			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE B-15. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 10 MINUTE SOAK

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TEST NO. 8

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.65	.63	1.08	3.11	3.03	5.18	243.8	237.8	406.2	.67	.65	1.12	17.98
2	.14	.13	.38	.65	.61	1.76	287.7	271.5	777.7	.78	.74	2.11	33.36
3	.08	.08	.12	.12	.12	.18	220.4	211.3	334.[illegible]	.50	[illegible]	[illegible]	[illegible]
4	.08	.08	.21	.08	.08	.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	.08	.08	.28	.02	.02	.07	181.3	171.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	.10	.10	.26	.10	.10	.26	218.9	208.4	561.2	[illegible]	[illegible]	[illegible]	[illegible]
7	.10	.10	.23	.42	.40	.98	221.6	211.0	515.3	.60	[illegible]	[illegible]	[illegible]
8	.07	.07	.13	.02	.02	.04	182.2	170.5	[illegible]	.42	[illegible]	[illegible]	[illegible]
EIGHT BAG TOTAL	1.30			4.52			1737.2			[illegible]			
505 SEC BAG MASS	1.18			4.72			1750.9						
PERCENT DIFFERENCE	-10.17			4.24			[illegible]						

TABLE B-16. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 16 HR SOAK
1977 Ford LTD

TEST NO. 6

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.64	3.47	6.07	97.93	93.27	163.22	278.5	265.3	464.2	.26	.25	.43	31.83
2	.25	.22	.68	2.67	2.38	7.22	363.7	324.2	982.9	.47	.42	1.27	42.53
3	.08	.08	.12	.11	.11	.17	199.7	202.4	302.6	.22	.22	.33	12.95
4	.08	.08	.21	.07	.07	.18	181.1	174.7	464.5	.30	.29	.77	20.06
5	.08	.08	.28	.05	.05	.17	176.5	167.6	608.6	.29	.28	1.00	26.07
6	.10	.09	.26	3.43	3.26	8.79	218.1	207.1	559.3	.47	.45	1.21	24.75
7	.09	.09	.21	.06	.06	.14	208.7	200.4	485.4	.53	.51	1.23	20.55
8	.06	.06	.11	.05	.05	.09	171.8	157.6	306.8	.35	.32	.63	13.04
EIGHT BAG TOTAL	4.38			104.37			1798.2			2.89			
505 SEC BAG MASS	4.16			93.72			1905.3			3.28			
PERCENT DIFFERENCE	-5.29			-11.36			5.62			11.89			

TEST NO. 7

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	4.63	4.40	7.72	114.02	108.25	190.03	288.3	273.7	480.5	.31	.29	.52	34.57
2	.26	.25	.70	4.11	3.98	11.11	332.5	321.8	898.6	.58	.56	1.57	39.19
3	.11	.10	.17	2.04	1.93	3.09	254.7	240.7	386.0	.23	.22	.35	16.71
4	.07	.07	.18	.07	.07	.18	185.4	176.8	475.3	.26	.25	.67	20.53
5	.08	.08	.28	2.66	2.53	9.17	185.4	176.5	639.2	.29	.28	1.00	27.97
6	.09	.09	.23	.03	.03	.08	217.5	206.8	557.6	.42	.40	1.08	24.08
7	.08	.08	.19	.04	.04	.09	215.9	205.6	502.1	.47	.45	1.09	21.25
8	.06	.06	.11	.03	.03	.05	175.5	162.5	313.3	.36	.33	.64	13.32
EIGHT BAG TOTAL	5.38			123.00			1855.1			2.92			
505 SEC BAG MASS	5.27			109.31			1924.4			3.13			
PERCENT DIFFERENCE	-2.09			-12.52			3.60			6.71			

TEST NO. 30

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.70	3.54	6.17	83.88	80.14	139.80	293.7	280.6	489.5	.31	.30	.52	31.35
2	.19	.18	.51	2.18	2.10	5.89	319.2	307.9	862.6	.59	.57	1.59	37.29
3	.11	.10	.17	2.35	2.23	3.56	245.1	232.7	371.3	.24	.23	.36	16.12
4	.06	.06	.15	.07	.07	.18	172.3	163.6	441.8	.27	.26	.69	19.08
5	.08	.08	.28	.04	.04	.14	178.2	167.3	614.4	.30	.28	1.03	26.31
6	.10	.10	.26	.03	.03	.08	212.6	204.1	545.3	.44	.42	1.13	23.55
7	.09	.09	.21	.03	.03	.07	207.5	197.3	482.5	.54	.51	1.26	20.42
8	.06	.06	.11	.03	.03	.05	165.4	153.6	295.3	.34	.32	.61	12.56
EIGHT BAG TOTAL	4.39			88.61			1794.0			3.03			
505 SEC BAG MASS	4.25			83.11			1873.0			3.49			
PERCENT DIFFERENCE	-3.29			-6.62			4.22			13.18			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

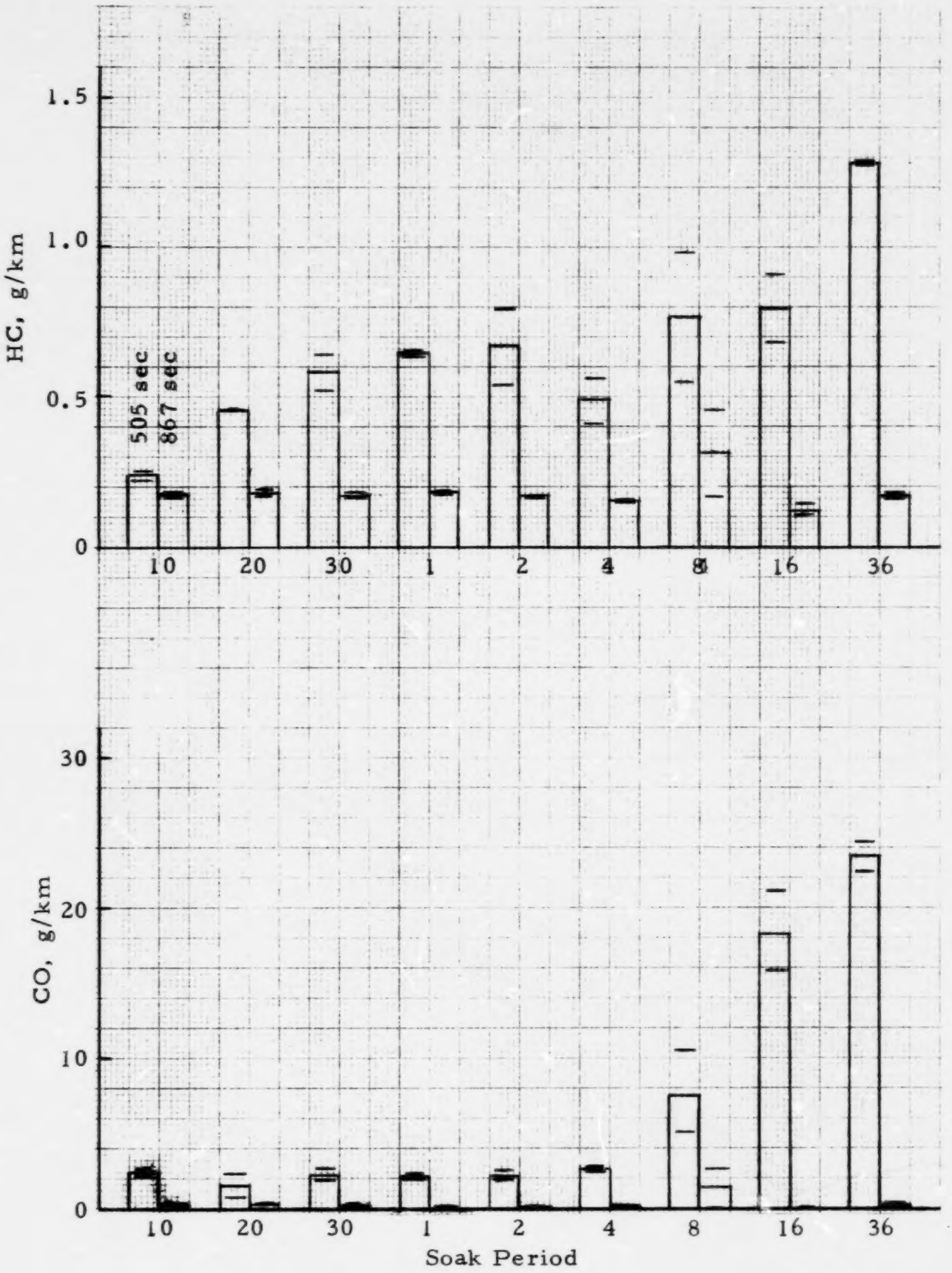

FIGURE B-1. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START 1977 Ford LTD

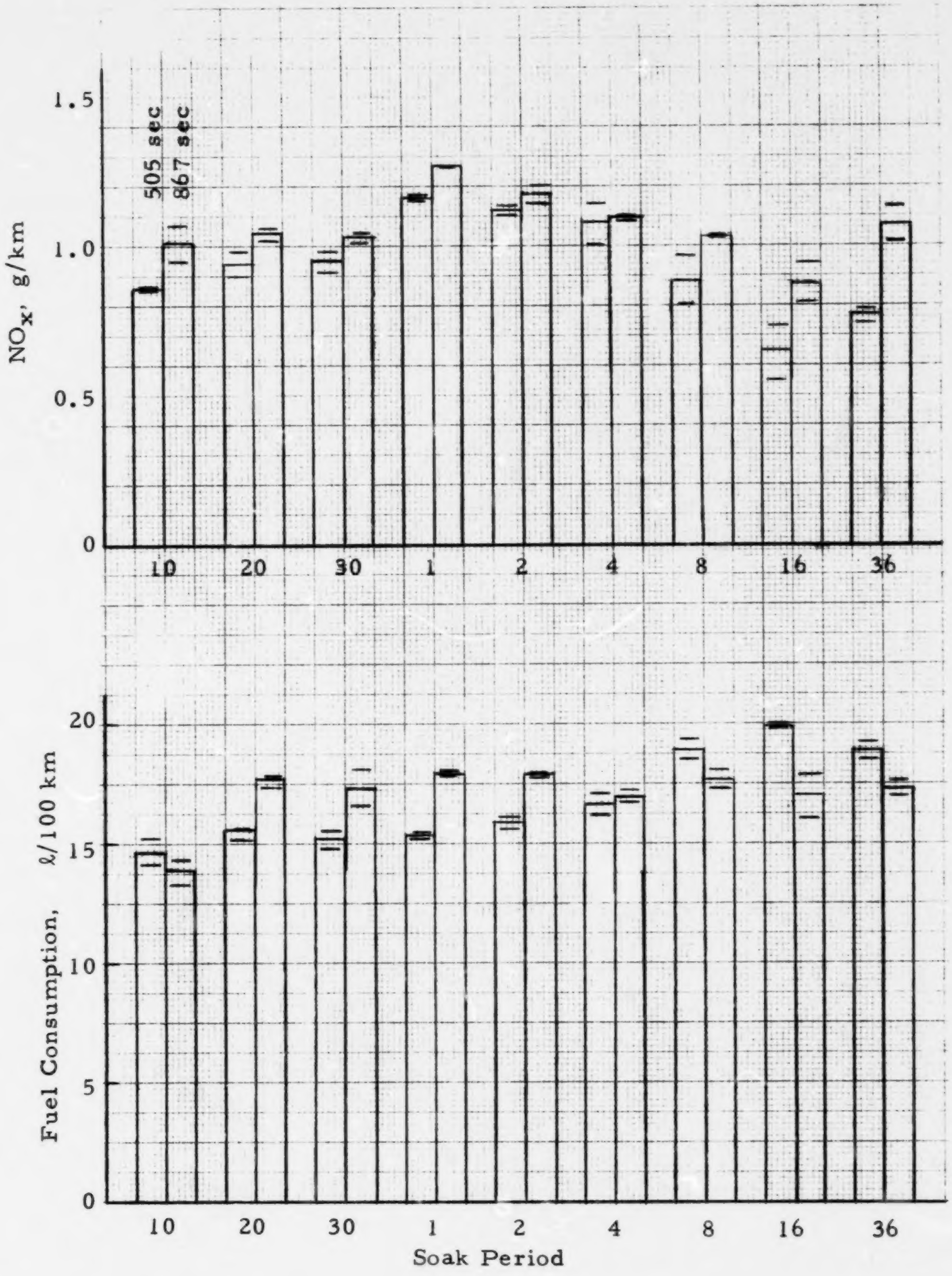

FIGURE B-2. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1977 Ford LTD

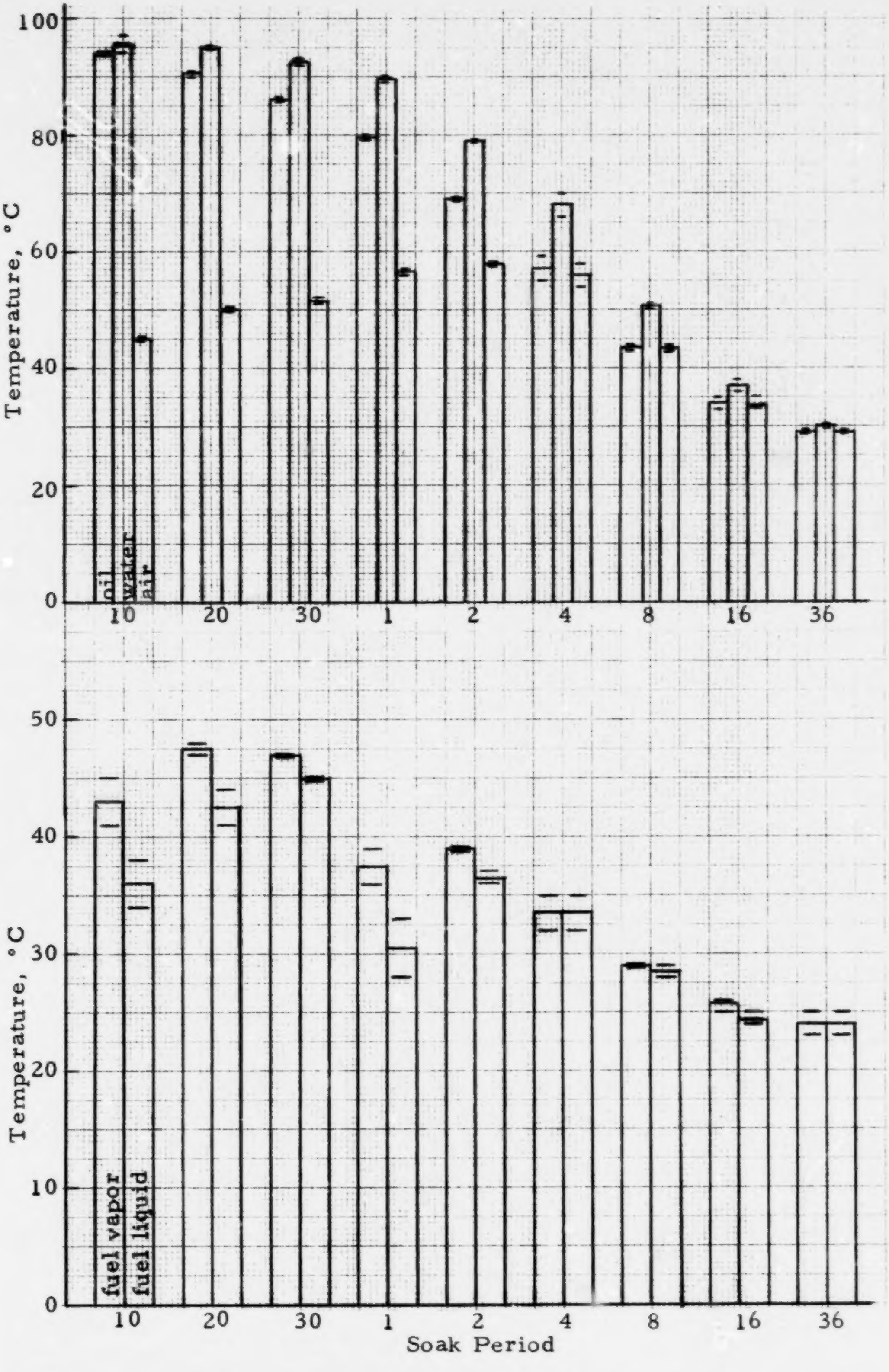

FIGURE B-3. AVERAGE TEMPERATURES DURING VARIOUS LENGTH SOAK PERIODS PRIOR TO DYNAMOMETER TESTS
1977 Ford LTD

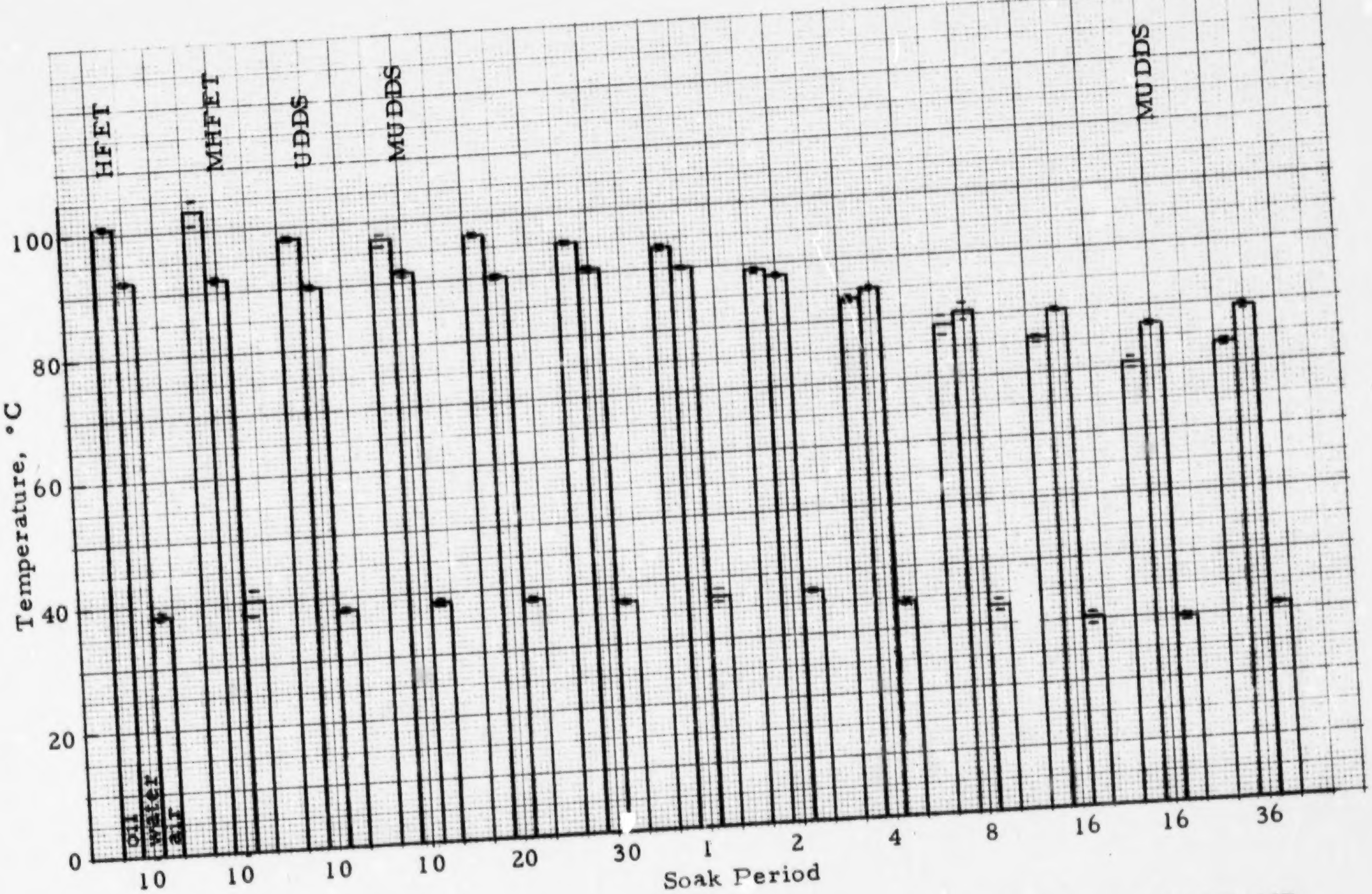

FIGURE B-4. AVERAGE OIL PAN, ENGINE WATER OUT, AND CARBURETOR INLET AIR TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1977 Ford LTD

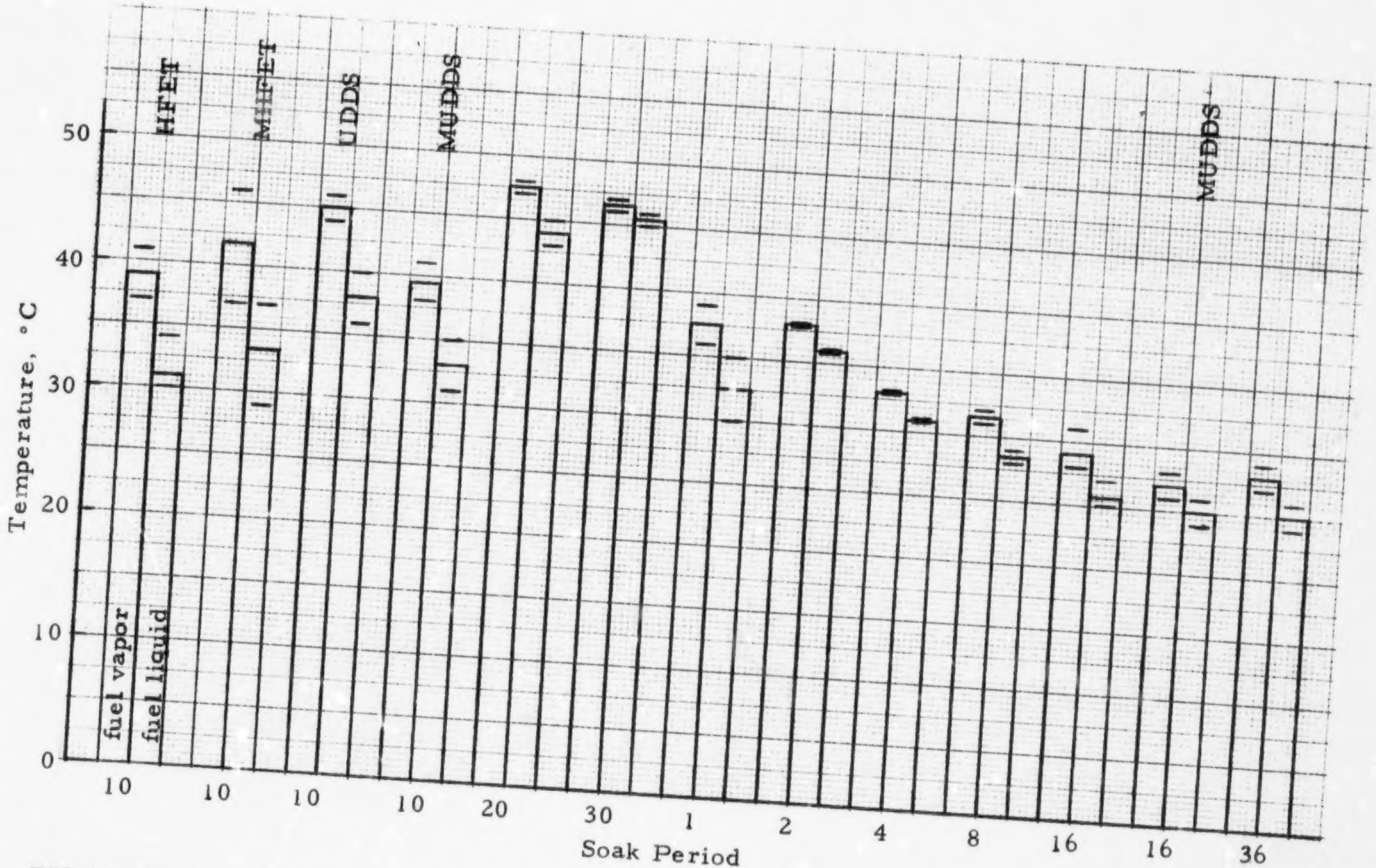

FIGURE B-5. AVERAGE FUEL TANK VAPOR AND FUEL TANK LIQUID TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS 1977 Ford LTD

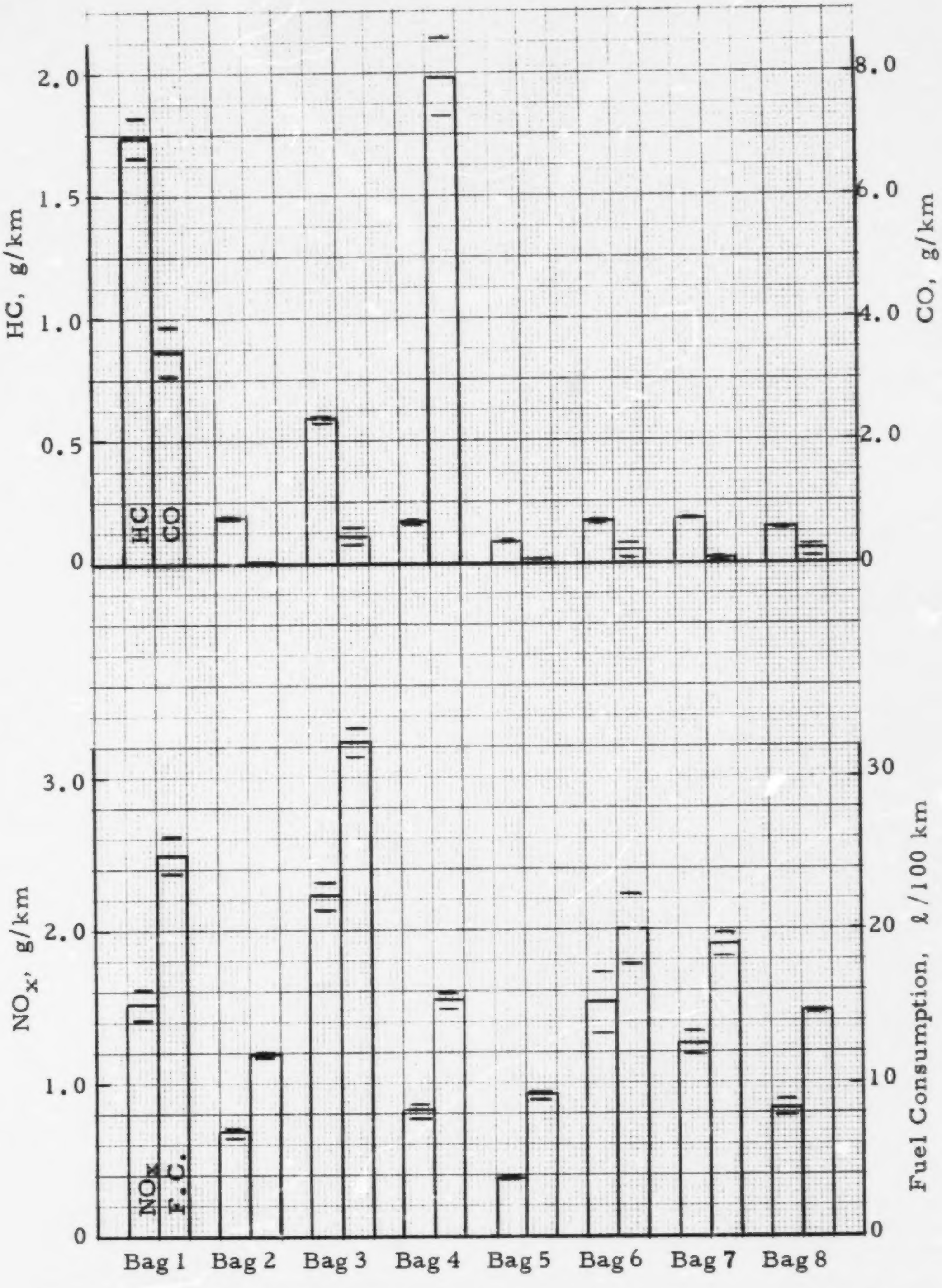

FIGURE B-6. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 10 MINUTE SOAK
1977 Ford LTD

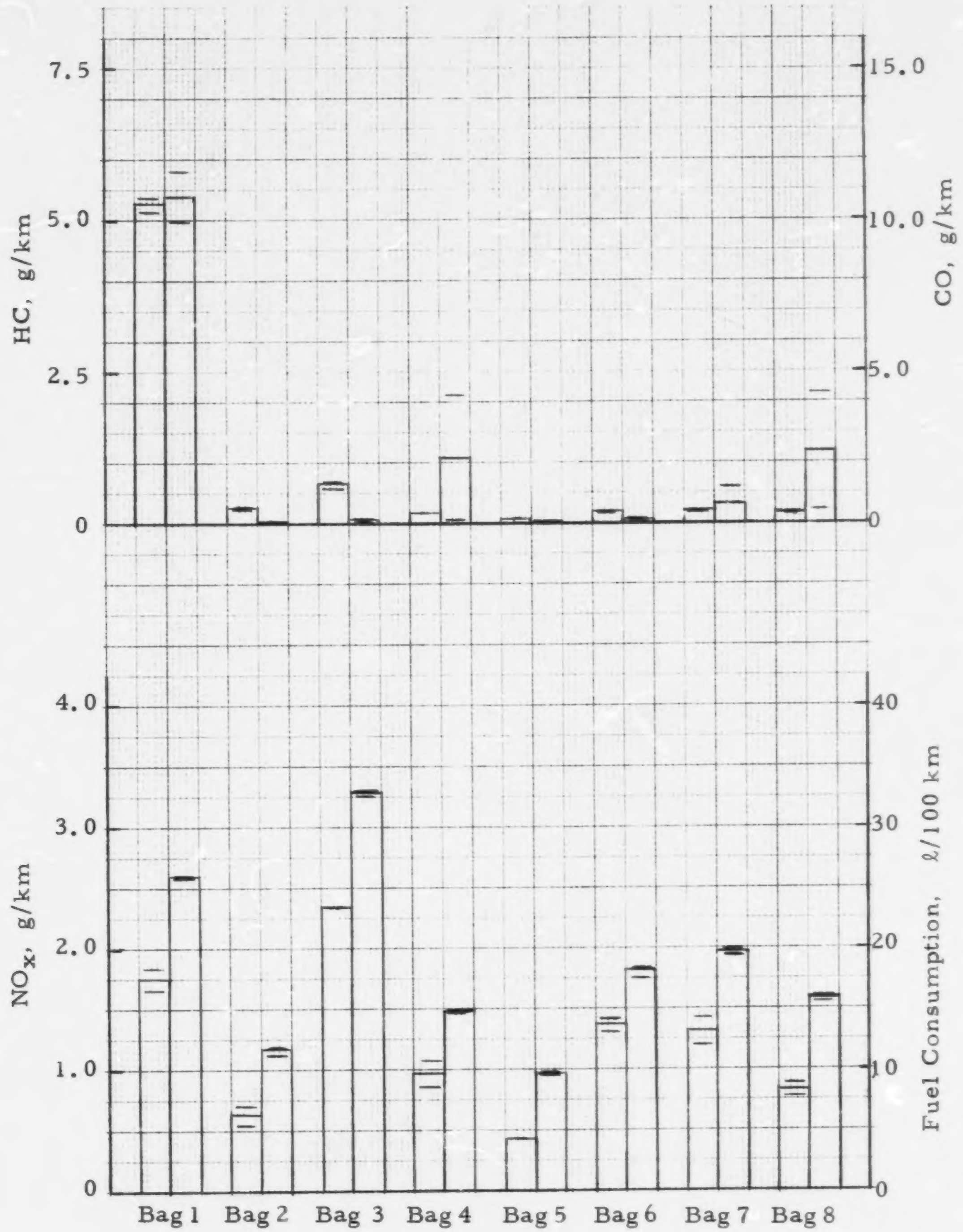

FIGURE B-7. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 20 MINUTE SOAK
1977 Ford LTD

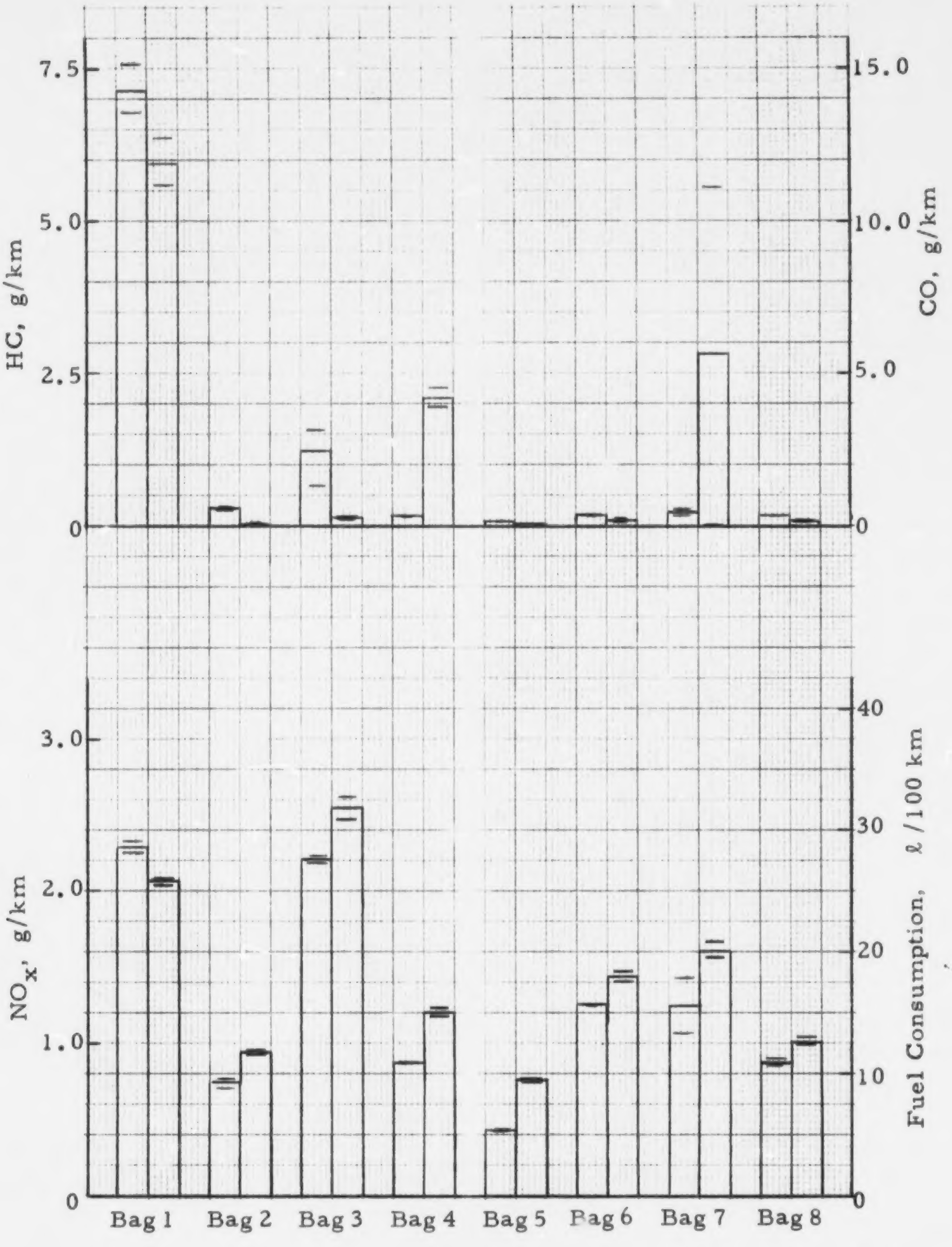

FIGURE B-8. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 30 MINUTE SOAK
1977 Ford LTD

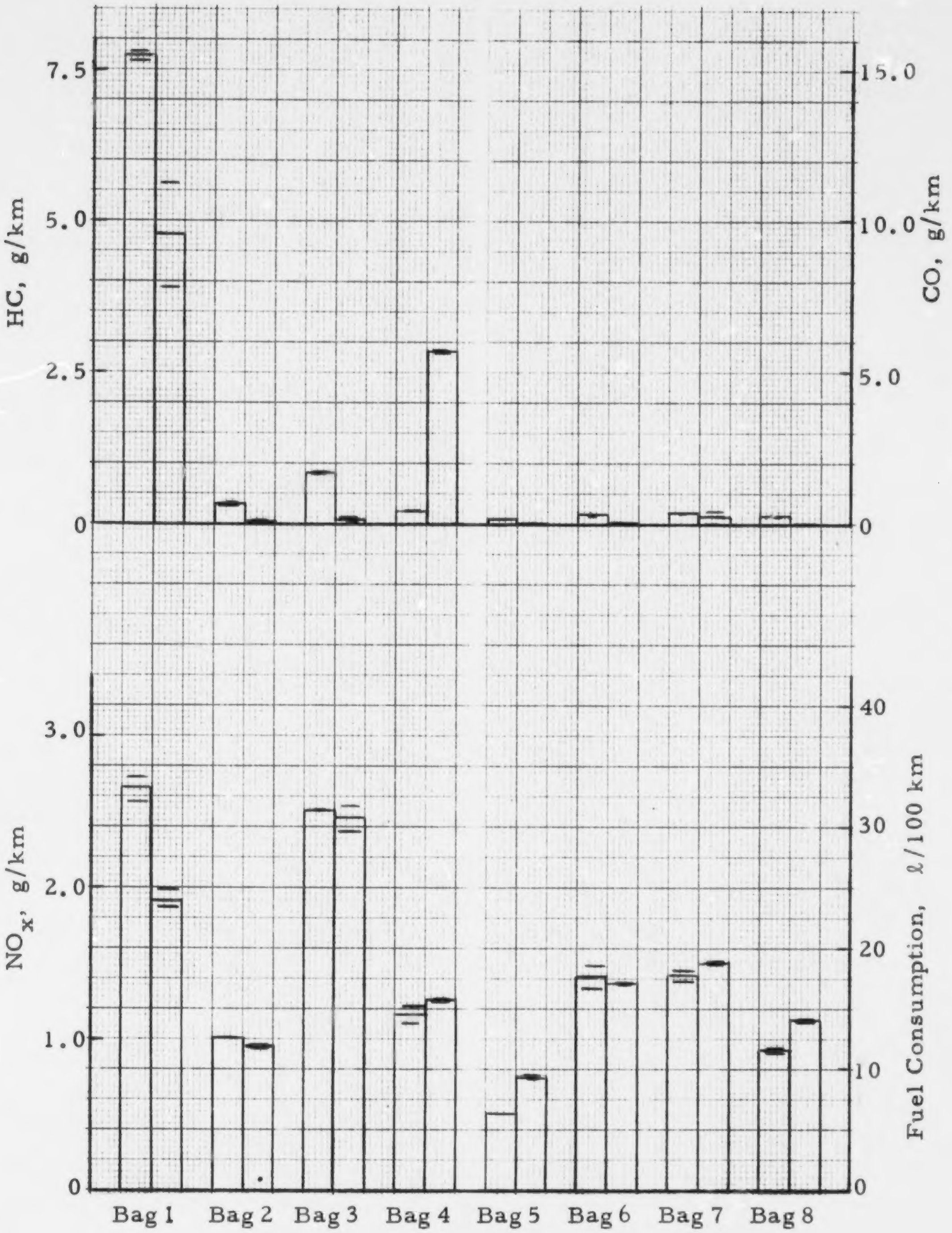

FIGURE B-9. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 1 HR SOAK
1977 Ford LTD

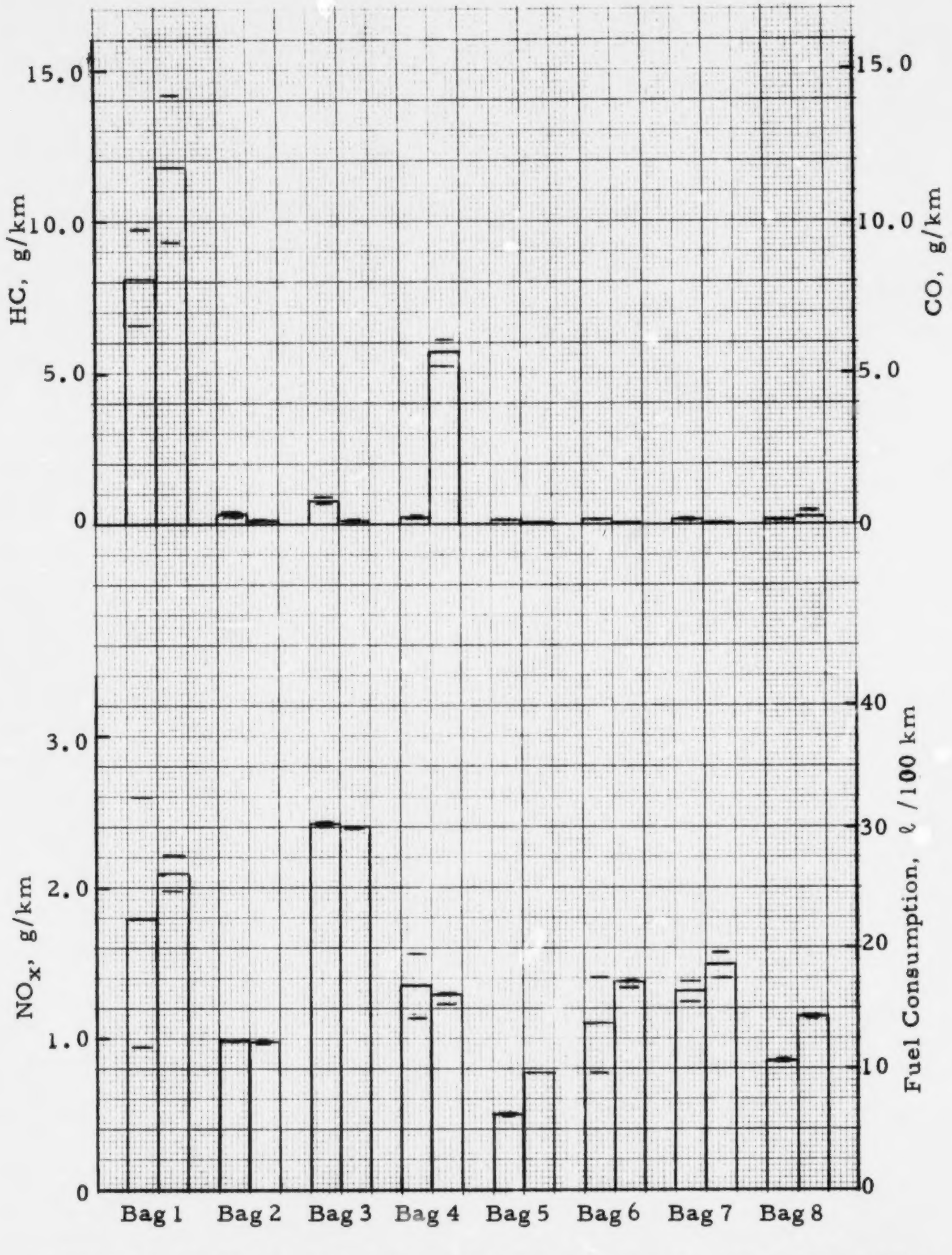

FIGURE B-10. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 2 HR SOAK
1977 Ford LTD

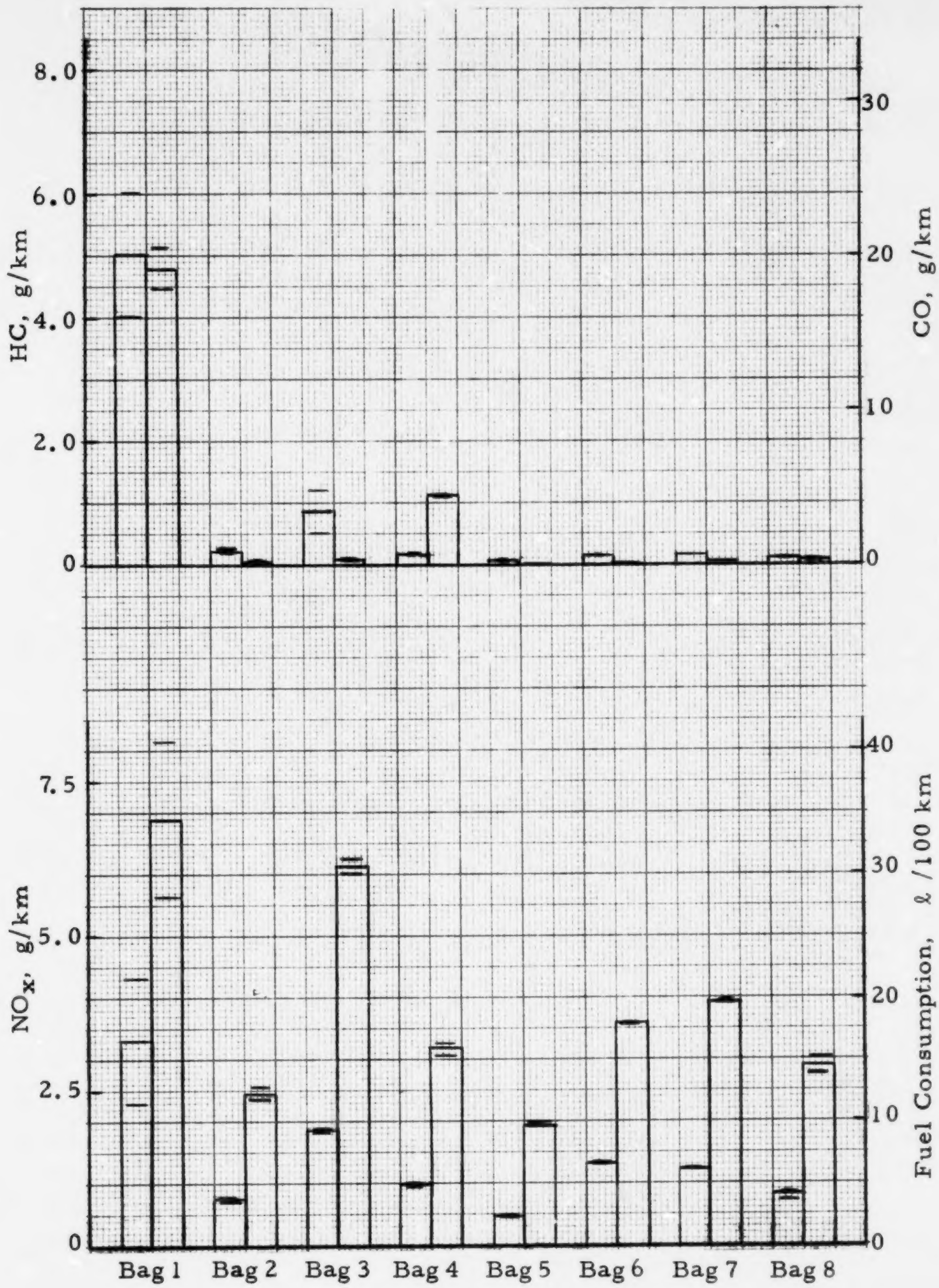

FIGURE B-11. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 4 HR SOAK
1977 Ford LTD

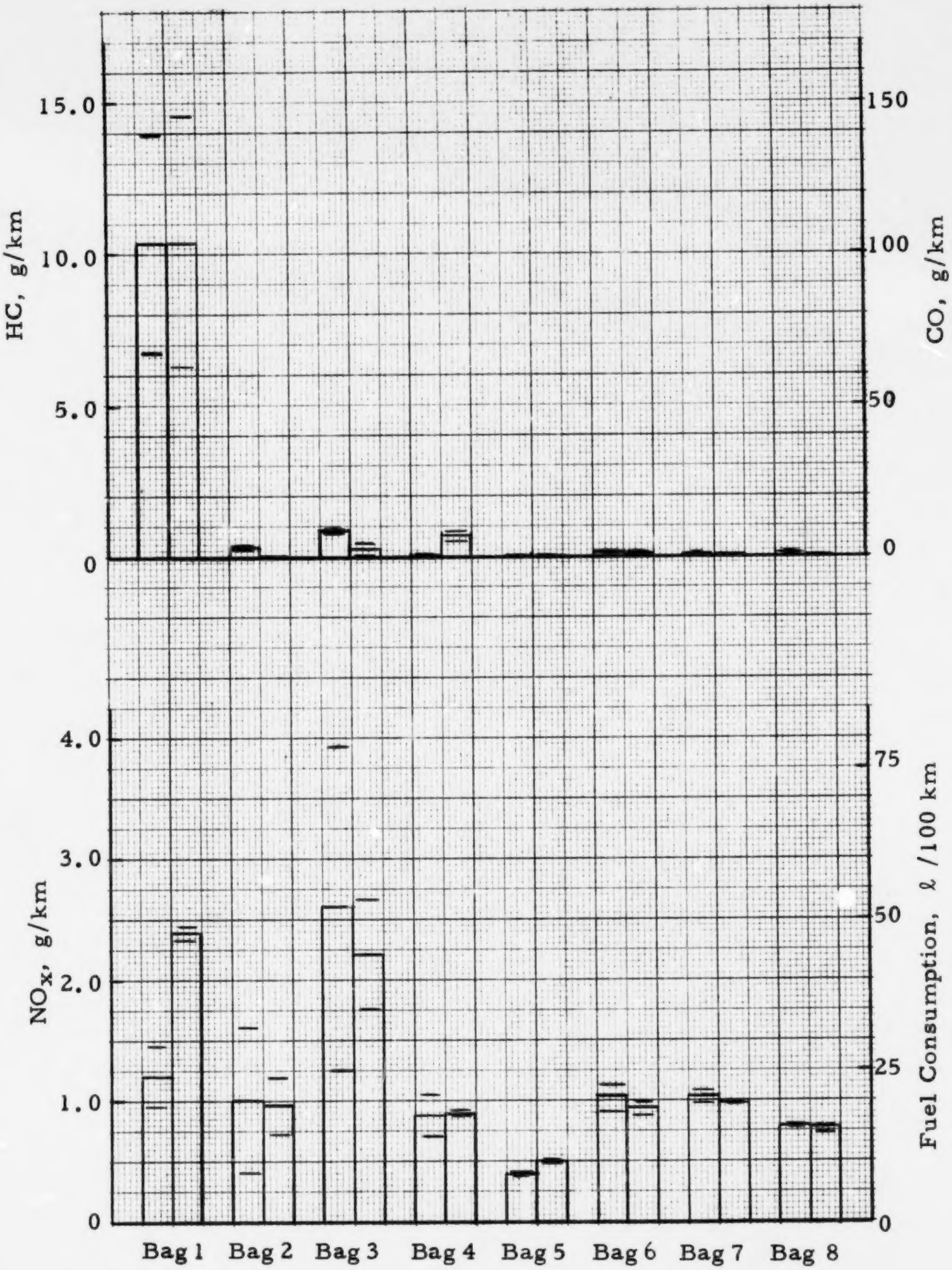

FIGURE B-12. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 8 HR SOAK
1977 Ford LTD

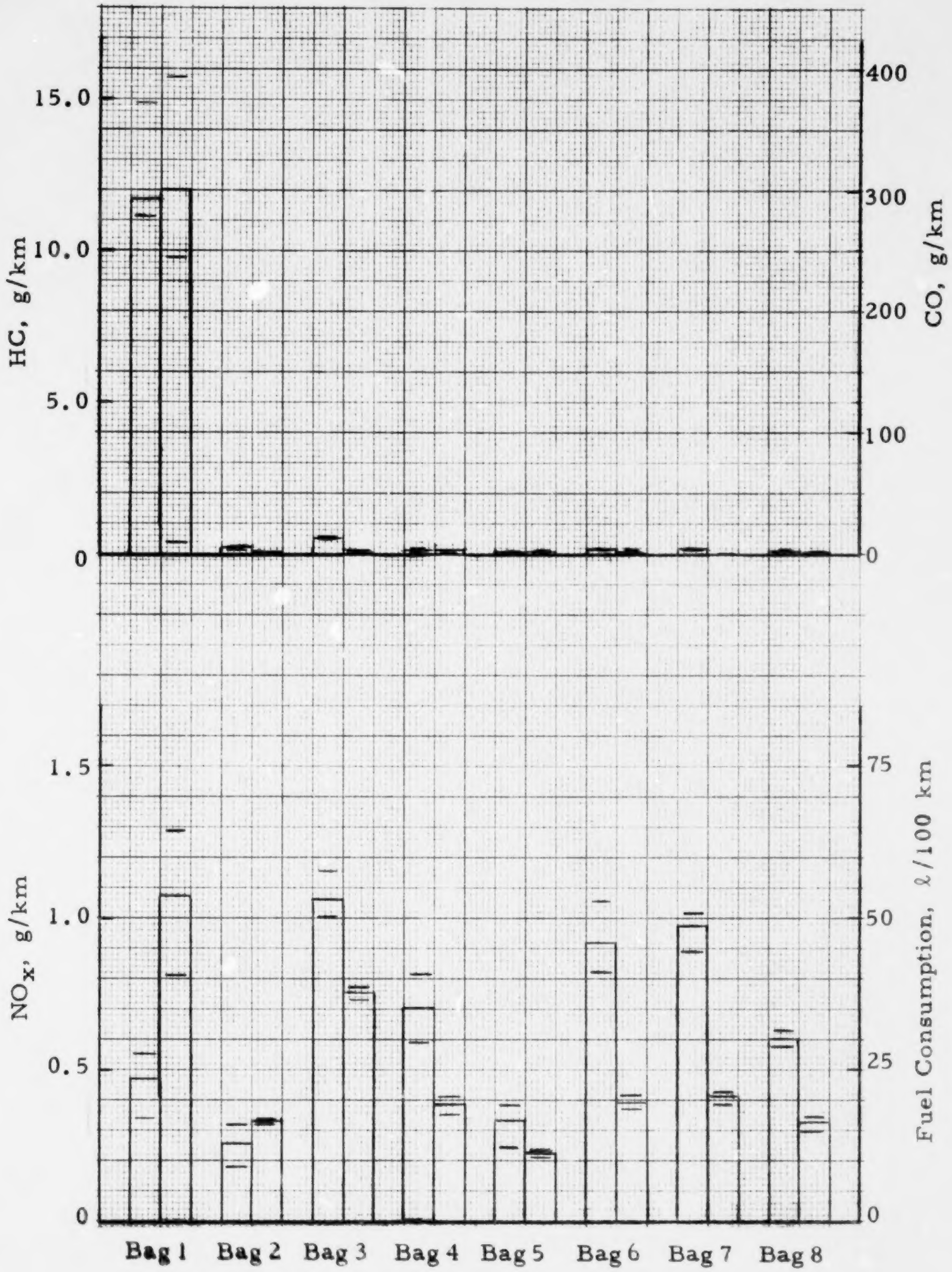

FIGURE B-13. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 16 HR SOAK
1977 Ford LTD

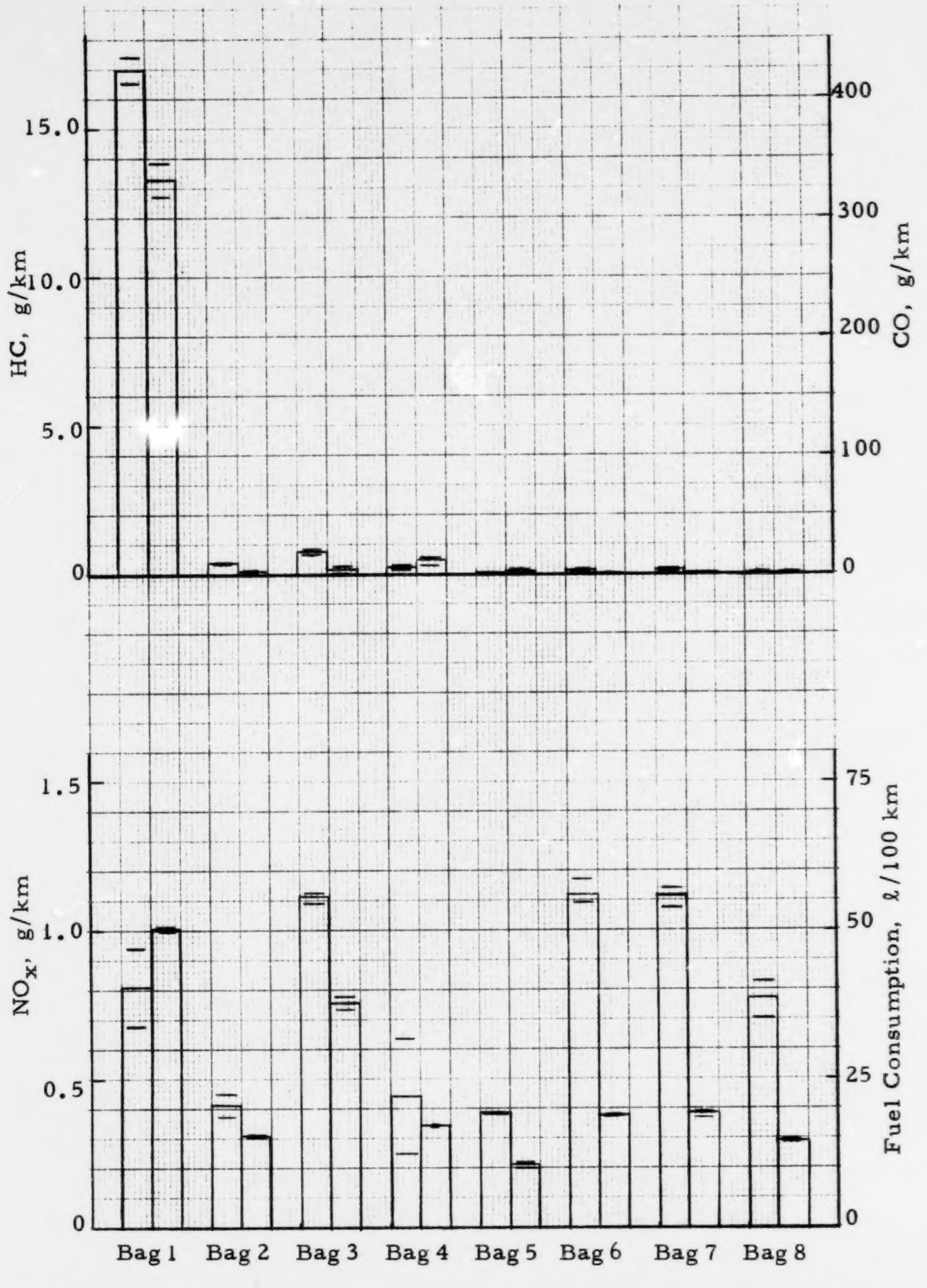

FIGURE B- 14. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES, AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 36 HR SOAK
1977 Ford LTD

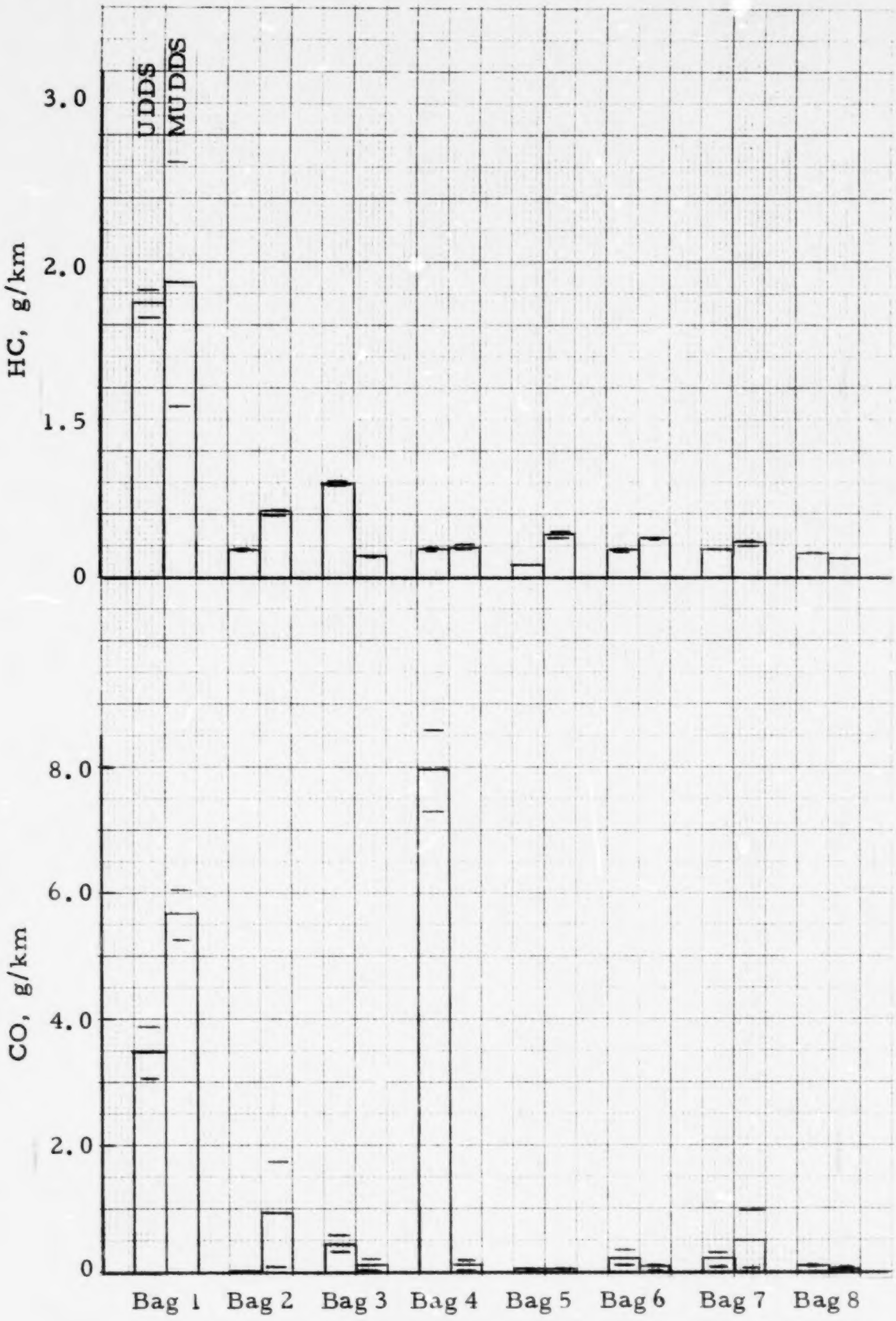

FIGURE B-15. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1977 Ford LTD

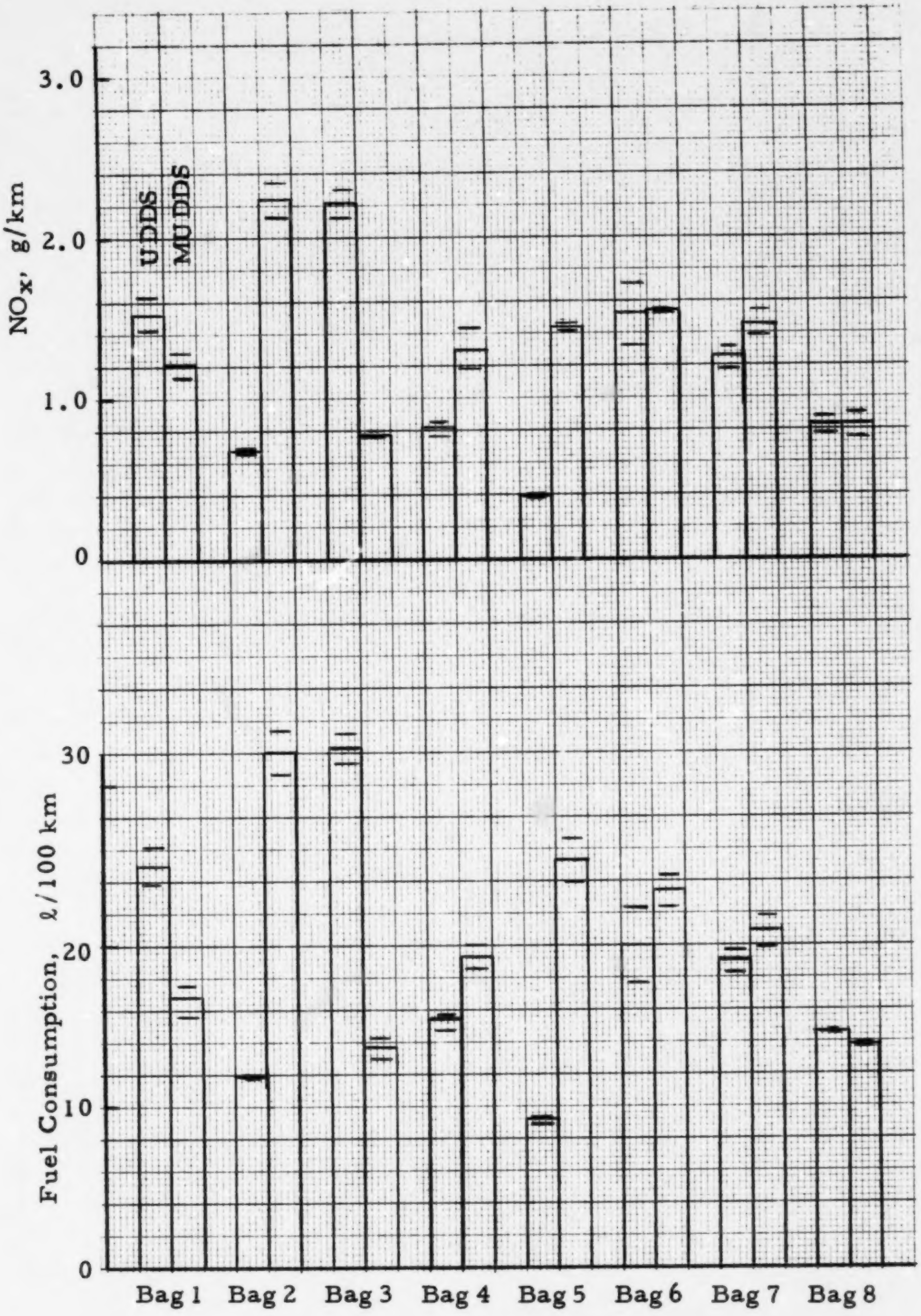

FIGURE B-16. INDIVIDUAL EIGHT BAG SEQUENCE NO$_x$ EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK 1977 Ford LTD

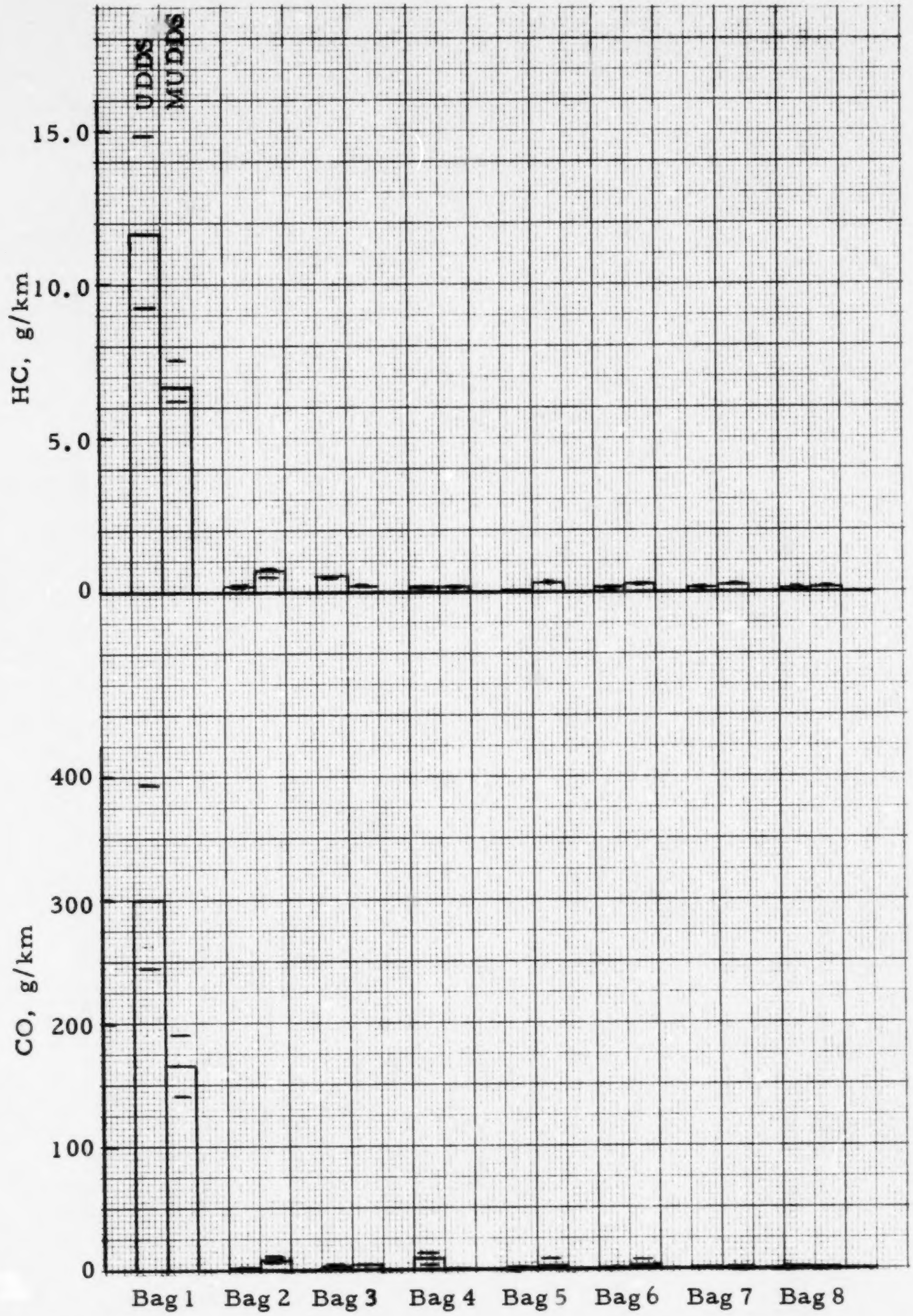

FIGURE B-17. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK

1977 Ford LTD

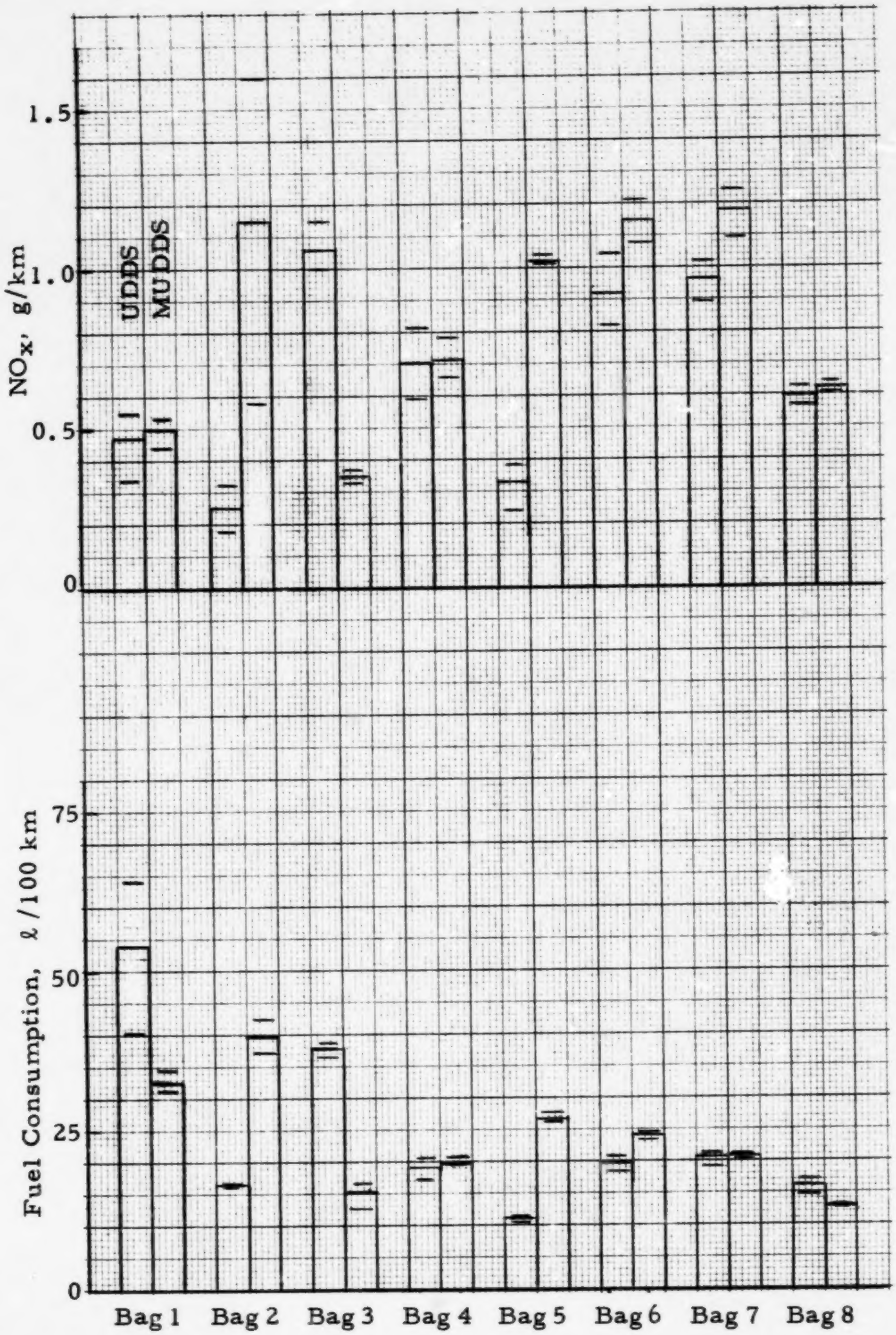

FIGURE B-18. INDIVIDUAL EIGHT BAG SEQUENCE NO$_x$ EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK 1977 Ford LTD

APPENDIX C

SUMMARIZED TEST DATA
1976 PLYMOUTH FURY

TABLE C-1. TEST NUMBERS CORRESPONDING TO DYNAMOMETER TESTS AT EACH CONDITION
1976 Plymouth Fury

Test Type	Replication 1	2	3
UDDS			
10 min soak	24	25	
20 min soak	22	23	
30 min soak	20	21	
1 hr soak	18	19	
2 hr soak	16	17	
4 hr soak	14	15	
8 hr soak	12	13	
16 hr soak	1	2	10
36 hr soak	9	11	
MUDDS			
10 min soak	7	8	
16 hr soak	4	5	6
HFET			
10 min soak	1	2	3
MHFET			
10 min soak	4	5	10

TABLE C-2. EMISSION AND FUEL ECONOMY RESULTS, URBAN DRIVING CYCLES
1976 Plymouth Fury

			HC, g/km			CO, g/km			NO_x, g/km			Fuel Consumption ℓ/100 km		
Soak Length	Test No.	Date	505(1) sec	867(2) sec	Cycle(3)	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle
							UDDS							
10 min	24	1/6/77	0.32	0.10	0.21	0.86	0.26	0.55	2.16	1.91	2.03	13.81	16.52	15.20
	25	1/6/77	0.33	0.10	0.21	1.26	0.23	0.72	2.19	1.76	1.97	14.08	15.37	14.73
		Average	0.33	0.10	0.21	1.06	0.25	0.64	2.18	1.84	2.00	13.95	15.95	14.97
			(0.52)(4)	(0.16)	(0.34)	(1.71)	(0.39)	(0.64)	(3.50)	(2.95)	(3.22)	(16.87)(5)	(14.75)	(15.71)
20 min	22	1/6/77	0.45	0.10	0.27	1.18	0.23	0.69	2.24	1.86	2.04	15.06	17.21	16.16
	23	1/6/77	0.42	0.09	0.25	1.16	0.26	0.70	2.14	1.79	1.96	14.68	16.36	15.53
		Average	0.44	0.10	0.26	1.17	0.25	0.70	2.19	1.83	2.00	14.87	16.79	15.85
			(0.70)	(0.15)	(0.42)	(1.88)	(0.39)	(1.12)	(3.52)	(2.94)	(3.22)	(15.82)	(14.01)	(14.85)
30 min	20	1/6/77	0.40	0.10	0.24	1.51	0.29	0.87	2.21	1.87	2.03	15.03	17.21	16.14
	21	1/6/77	0.49	0.09	0.28	1.84	0.22	0.99	2.24	1.81	2.02	15.47	17.02	16.25
		Average	0.45	0.10	0.26	1.68	0.26	0.93	2.23	1.84	2.03	15.25	17.12	16.20
			(0.72)	(0.15)	(0.42)	(2.70)	(0.41)	(1.50)	(3.58)	(2.96)	(3.26)	(15.43)	(13.74)	(14.53)
1 hr	18	1/5/77	0.54	0.09	0.31	2.10	0.25	1.13	2.28	1.93	2.09	15.40	17.57	16.50
	19	1/5/77	0.54	0.09	0.31	1.88	0.21	1.01	2.06	1.82	1.93	15.12	17.19	16.17
		Average	0.54	0.09	0.31	1.98	0.23	1.07	2.17	1.88	2.01	15.26	17.38	16.34
			(0.87)	(0.14)	(0.50)	(3.18)	(0.37)	(1.71)	(3.49)	(3.02)	(3.23)	(15.42)	(13.54)	(14.40)
2 hr	16	1/5/77	0.88	0.09	0.47	7.81	0.40	3.95	2.16	1.84	1.99	16.15	17.18	16.66
	17	1/5/77	0.86	0.08	0.45	8.24	0.24	4.07	2.20	1.96	2.08	15.92	17.66	16.79
		Average	0.87	0.09	0.46	8.03	0.32	4.01	2.18	1.90	2.04	16.04	17.42	16.73
			(1.40)	(0.14)	(0.74)	(12.91)	(0.51)	(6.45)	(3.51)	(3.06)	(3.27)	(14.67)	(13.50)	(14.07)
4 hr	14	1/4/77	0.93	0.13	0.51	10.85	0.44	5.43	2.09	2.05	2.07	17.20	18.31	17.74
	15	1/4/77	0.83	0.10	0.45	10.22	0.38	5.09	2.06	1.94	2.00	16.70	17.95	17.32
		Average	0.88	0.12	0.48	10.54	0.41	5.26	2.08	2.00	2.04	16.95	18.13	17.53
			(1.42)	(0.19)	(0.77)	(16.95)	(0.66)	(8.46)	(3.34)	(3.21)	(3.27)	(13.88)	(12.98)	(13.42)
8 hr	12	12/30/76	1.00	0.10	0.53	13.08	0.56	6.55	2.05	1.97	2.01	17.72	18.15	17.91
	13	1/3/77	1.04	0.12	0.56	12.83	0.36	6.33	2.21	2.19	2.20	17.98	18.04	17.97
		Average	1.02	0.11	0.55	12.96	0.46	6.44	2.13	2.08	2.11	17.85	18.10	17.94
			(1.64)	(0.18)	(0.88)	(20.84)	(0.74)	(10.36)	(3.43)	(3.35)	(3.39)	(13.18)	(13.00)	(13.11)
16 hr	1	11/30/76	1.17	0.05	0.59	15.75	0.20	7.64	2.00	1.83	1.91	18.09	17.14	17.56
	2	12/2/76	1.07	0.13	0.58	14.66	0.18	7.11	2.13	2.00	2.06	18.07	18.05	18.02
	10	12/10/76	1.17	0.14	0.63	14.78	0.50	7.34	2.19	1.97	2.07	18.79	18.27	18.48
		Average	1.14	0.11	0.60	15.06	0.29	7.36	2.11	1.93	2.01	18.32	17.82	18.02
			(1.83)	(0.17)	(0.97)	(24.24)	(0.47)	(11.85)	(3.39)	(3.11)	(3.24)	(12.84)	(13.20)	(13.03)
36 hr	9	12/9/76	1.20	0.11	0.63	17.41	0.32	8.50	2.11	2.03	2.06	19.34	18.53	18.87
	11	12/16/76	1.15	0.04	0.57	17.86	0.22	8.66	2.09	2.01	2.05	19.28	18.51	18.84
		Average	1.18	0.08	0.60	17.64	0.27	8.58	2.10	2.02	2.06	19.31	18.52	18.86
			(1.89)	(0.12)	(0.97)	(28.37)	(0.43)	(13.81)	(3.38)	(3.25)	(3.31)	(12.18)	(12.70)	(12.48)
							MUDDS							
10 min	7	12/5/76	0.37	0.15	0.21	1.67	0.49	0.85	2.33	2.04	2.12	20.26	15.24	16.75
	8	12/6/76	0.30	0.10	0.16	1.75	0.34	0.77	2.50	1.91	2.09	19.99	15.46	16.82
		Average	0.34	0.13	0.19	1.71	0.42	0.81	2.42	1.98	2.11	20.13	15.35	16.79
			(0.54)	(0.20)	(0.30)	(2.75)	(0.67)	(1.30)	(3.89)	(3.18)	(3.39)	(11.69)	(15.33)	(14.01)
16 hr	4	12/5/76	1.56	0.16	0.59	21.95	0.56	7.09	1.93	2.17	2.09	23.57	16.48	18.61
	5	12/6/76	1.66	0.08	0.56	28.63	0.56	9.13	1.75	2.10	2.00	23.42	15.96	18.20
	6	12/7/76	1.40	0.09	0.49	27.87	0.31	8.72	1.87	2.09	2.02	22.74	16.00	18.02
		Average	1.54	0.11	0.55	26.17	0.48	8.31	1.85	2.12	2.04	23.24	16.15	18.28
			(2.48)	(0.18)	(0.88)	(42.10)	(0.77)	(13.38)	(2.98)	(3.41)	(3.28)	(10.12)	(14.57)	(12.87)

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(1) First 505 second bag results
(2) Last 867 second bag results
(3) 23 minute cycle composite
(4) g/mi
(5) mi/gal

TABLE C-3. EMISSION AND FUEL ECONOMY RESULTS OF HFET AND MODIFIED HFET
1976 Plymouth Fury

Test Cycle	Test No.	Date Run	HC, g/km	CO, g/km	NO_x, g/km	Fuel Consumption, ℓ/100 km
HFET	1	11/30/76	0.08	0.21	2.43	11.26
	2	12/2/76	0.09	0.24	2.49	10.98
	3	12/3/76	0.09	0.19	2.41	11.04
	Average		0.09	0.21	2.44	11.09
			(0.14)(1)	(0.34)(1)	(3.93)(1)	21.21(2)
MHFET	4	12/5/76	0.10	0.58	2.74	12.04
	5	12/6/76	0.09	0.47	2.46	11.78
	10	12/10/76	0.11	0.54	2.62	12.23
	Average		0.10	0.52	2.61	12.02
			(0.16)	(0.83)	(4.19)	(19.58)

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(1)g/mi
(2)mi/gal

TABLE C-4. SOAK TEMPERATURE DATA, 1976 PLYMOUTH FURY

Soak Length	Test No.	Soak Date(s)	Temperature, °C														
			Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
10 min	24	1/6/77	47	34	40	102	91	97	99	93	96	41	40	40	38	38	38
	25	1/6/77	47	33	40	100	91	99	99	90	98	42	41	41	40	39	40
	Overall Average				40			98			97			41			39
20 min	22	1/6/77	48	33	43	99	90	96	99	84	93	39	37	38	37	36	36
	23	1/6/77	50	33	44	100	91	95	99	85	92	41	35	37	39	35	36
	Overall Average				44			96			93			38			36
30 min	20	1/6/77	49	33	43	102	90	94	98	78	87	31	29	29	29	27	28
	21	1/6/77	48	33	43	99	87	93	99	79	89	36	34	34	34	32	33
	Overall Average				43			94			88			32			31
1 hr	18	1/5/77	49	33	47	102	65	87	99	65	81	36	30	31	33	29	30
	19	1/5/77	50	32	45	100	76	84	99	66	77	36	32	32	33	31	31
	Overall Average				46			86			79			32			31
2 hr	16	1/5/77	47	31	44	98	51	72	96	48	66	33	28	29	34	26	28
	17	1/5/77	49	33	45	100	52	73	98	49	67	36	29	30	33	28	30
	Overall Average				45			73			67			30			29
4 hr	14	1/4/77	49	34	41	101	39	58	99	37	55	32	26	27	30	25	27
	15	1/4/77	50	35	42	100	40	58	98	39	55	35	28	29	32	27	29
	Overall Average				42			58			55			28			28
8 hr	12	12/30/76	53	29	39	101	32	48	96	30	44	33	25	27	30	25	26
	13	1/3/77	54	29	38	104	31	48	99	30	44	32	24	25	28	23	25
	Overall Average				39			48			44			26			26
16 hr	1	11/29-11/30/76	57	25	31	90	24	34	96	24	34	31	23	24	29	21	23
	2	12/1-12/2/76	64	27	35	101	28	38	95	26	36	31	24	25	30	24	25
	10	12/9-12/16/76	55	27	33	104	27	37	99	27	36	40	26	27	37	26	27
	Overall Average				33			36			35			25			25
36 hr	9	12/7-12/9/76	51	25	27	102	25	28	98	25	29	35	22	25	34	22	25
	11	12/14-12/16/76	50	24	26	100	24	28	96	24	28	32	23	24	30	22	23
	Overall Average				27			28			29			25			24

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE C-5. TEMPERATURES MEASURED DURING VARIOUS TRANSIENT CYCLES
1976 Plymouth Fury

Soak Length	Test No.	Date	Temperature, °C														
			Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
UDDS																	
10 min	24	1/6/76	46	30	33	98	81	89	103	91	100	42	40	41	40	37	39
	25	1/6/76	47	33	34	97	80	89	102	91	99	44	40	42	41	39	40
	Overall Average				34			89			100			42			40
20 min	22	1/6/77	46	33	34	96	81	89	100	83	98	41	37	39	39	35	37
	23	1/6/77	49	33	34	96	82	89	101	85	99	40	36	38	38	34	36
	Overall Average				34			89			99			39			37
30 min	20	1/6/77	49	32	33	95	78	89	100	79	87	36	30	33	33	28	36
	21	1/6/77	48	33	36	96	79	87	100	78	97	39	33	36	36	32	34
	Overall Average				35			88			92			35			32
1 hr	18	1/5/77	44	29	31	95	70	87	99	63	94	35	30	32	32	28	30
	19	1/5/77	49	31	32	94	73	88	99	65	95	37	32	34	34	31	32
	Overall Average				32			88			95			33			31
2 hr	16	1/5/77	39	28	33	94	51	84	98	48	89	36	28	31	32	26	29
	17	1/5/77	40	29	32	94	52	84	9	49	90	36	29	31	33	28	30
	Overall Average				33			84			90			31			30
4 hr	14	1/4/77	34	27	32	92	39	82	98	37	87	35	26	30	32	25	29
	15	1/4/77	34	27	32	92	40	82	98	39	86	36	28	32	33	27	31
	Overall Average				32			82			87			31			30
8 hr	12	12/30/76	34	26	31	92	32	79	97	30	83	35	25	30	32	25	29
	13	1/3/77	33	26	30	92	31	78	98	30	82	33	24	27	29	23	26
	Overall Average				31			79			83			29			28
16 hr	1	11/30/76	35	25	31	93	24	76	98	24	80	32	24	26	30	23	25
	2	12/2/76	33	27	31	93	26	77	98	26	81	31	24	28	30	24	26
	10	12/10/76	36	27	31	93	27	78	97	27	81	34	26	29	32	26	28
	Overall Average				31			77			81			28			26
36 hr	9	12/9/76	36	26	32	93	25	77	98	25	80	34	25	28	32	25	27
	11	12/16/76	33	24	30	92	24	76	97	24	80	32	24	27	31	24	26
	Overall Average				31			77			80			28			27
MUDDS																	
10 min	7	12/5/76	51	36	37	96	83	90	104	95	99	38	33	35	36	33	33
	8	12/6/76	50	34	35	96	88	89	104	96	99	37	32	34	35	33	32
	Overall Average				36			90			99			35			33
16 hr	4	12/5/76	37	28	32	96	28	76	103	28	78	33	26	28	31	26	28
	5	12/6/76	37	28	31	92	28	76	102	27	78	33	27	28	31	27	28
	6	12/7/76	35	26	30	96	26	75	103	25	77	32	25	27	30	25	26
	Overall Average				31			75			77			27			27
HFET																	
10 min	1	11/30/76	39	33	34	98	88	93	115	92	107	36	32	33	34	30	31
	2	12/2/76	36	32	33	98	81	94	114	91	108	36	32	34	34	31	32
	3	12/3/76	37	34	34	98	88	93	114	92	107	37	32	34	35	31	32
	Overall Average				34			94			107			33			31
MHFET																	
10 min	4	12/5/76	53	41	42	99	88	93	118	100	111	44	37	39	41	37	37
	5	12/6/76	50	37	37	99	88	94	117	97	110	42	37	38	37	36	36
	10	12/10/76	47	38	39	99	83	93	116	93	107	40	33	36	38	33	34
	Overall Average				39			94			109			38			36

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE C-6. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 10 MINUTE SOAK

1976 Plymouth Fury

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TEST NO. 24

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.12	1.06	3.20	2.23	2.10	6.37	178.9	168.8	511.2	1.05	.99	3.00	22.43
2	.27	.26	.38	.39	.37	.54	184.0	174.1	255.6	1.05	.99	1.46	10.94
3	.11	.11	.46	.38	.36	1.58	175.5	168.0	731.4	.81	.78	3.37	31.22
4	.15	.14	.11	1.09	1.03	.90	438.5	416.3	320.1	3.78	3.59	2.76	13.75
5	.11	.10	.08	.18	.17	.13	300.5	283.9	214.6	1.87	1.77	1.34	9.18
6	.06	.06	.11	.18	.17	.33	214.5	205.6	390.0	1.50	1.44	2.73	16.78
7	.05	.05	.12	.14	.13	.33	166.5	159.1	396.4	.81	.77	1.93	17.03
8	.06	.06	.08	.14	.13	.19	214.8	198.3	298.3	1.50	1.38	2.08	12.69
EIGHT BAG TOTAL	1.93			4.73			1873.2			12.37			
505 SEC BAG MASS	1,87			4.97			1854.5			12.48			
PERCENT DIFFERENCE	-3.21			4.83			-1.01			.88			

TEST NO. 25

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.43	1.38	4.09	5.52	5.32	15.77	209.6	202.1	598.7	1.37	1.32	3.91	26.87
2	.20	.19	.28	.42	.39	.58	209.7	194.8	291.3	1.02	.95	1.42	12.44
3	.10	.10	.42	.38	.37	1.58	180.5	174.1	751.9	.75	.72	3.12	32.08
4	.13	.12	.09	.42	.40	.31	465.3	439.7	339.7	4.09	3.86	2.99	14.56
5	.11	.10	.08	.18	.17	.13	283.1	269.2	202.2	1.89	1.80	1.35	8.65
6	.06	.06	.11	.11	.10	.20	220.2	209.4	400.5	1.52	1.45	2.76	17.22
7	.06	.06	.14	.15	.14	.36	183.7	177.0	437.5	1.05	1.01	2.50	18.79
8	.06	.06	.08	.22	.21	.31	218.9	204.9	304.0	1.43	1.34	1.99	12.94
EIGHT BAG TOTAL	2.15			7.40			1971.0			13.12			
505 SEC BAG MASS	1.91			7.26			1886.9			12.65			
PERCENT DIFFERENCE	-12.57			-1.93			-4.46			-3.72			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C- 7. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 20 MINUTE SOAK

1976 Plymouth Fury

TEST NO. 22

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.37	1.30	3.91	2.98	2.83	8.51	182.3	173.1	520.9	1.14	1.08	3.26	23.08
2	.48	.45	.67	.90	.85	1.25	172.0	162.8	238.9	.85	.80	1.18	10.32
3	.28	.27	1.17	1.00	.96	4.17	174.6	167.1	727.5	.76	.73	3.17	31.32
4	.11	.10	.08	.20	.19	.15	387.9	365.9	283.1	3.70	3.49	2.70	12.13
5	.11	.10	.08	.19	.18	.14	280.2	266.4	200.1	1.87	1.78	1.34	8.56
6	.06	.06	.11	.11	.11	.20	209.2	200.2	380.4	1.47	1.41	2.67	16.36
7	.06	.06	.14	.29	.27	.69	167.5	158.5	398.8	.84	.79	2.00	17.16
8	.07	.07	.10	.18	.17	.25	222.1	206.3	308.5	1.46	1.36	2.03	13.12
EIGHT BAG TOTAL	2.54			5.85			1795.8			12.09			
505 SEC BAG MASS	2.60			6.82			2018.1			12.92			
PERCENT DIFFERENCE	2.31			14.22			11.01			6.42			

TEST NO. 23

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.35	1.29	3.86	3.18	3.03	9.09	195.7	186.7	559.1	1.23	1.17	3.51	24.72
2	.70	.66	.97	1.14	1.08	1.58	204.5	194.1	284.0	1.03	.98	1.43	12.29
3	.25	.24	1.04	1.04	.98	4.33	178.9	169.3	745.6	.66	.62	2.75	32.08
4	.15	.14	.11	.70	.67	.51	457.8	438.8	334.2	3.86	3.70	2.82	14.34
5	.11	.10	.08	.14	.13	.10	282.8	268.1	202.0	1.71	1.62	1.22	8.64
6	.06	.06	.11	.08	.08	.15	218.5	208.4	397.3	1.40	1.34	2.55	17.08
7	.06	.06	.14	.27	.26	.64	184.8	176.3	440.0	1.05	1.00	2.50	18.92
8	.07	.07	.10	.31	.29	.43	249.8	234.1	346.9	1.65	1.55	2.29	14.77
EIGHT BAG TOTAL	2.75			6.86			1972.8			12.59			
505 SEC BAG MASS	2.42			6.73			1966.7			12.36			
PERCENT DIFFERENCE	-13.64			-1.93			-.31			-1.86			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-8. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 30 MINUTE SOAK
1976 Plymouth Fury

TEST NO. 20

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.29	1.22	3.69	5.15	4.85	14.71	184.0	173.3	525.7	1.09	1.03	3.11	23.66
2	.51	.49	.71	1.19	1.14	1.65	186.0	177.7	258.3	1.02	.97	1.42	11.17
3	.29	.27	1.21	1.01	.96	4.21	175.8	166.4	732.6	.76	.72	3.17	31.54
4	.17	.16	.12	.93	.88	.68	462.0	439.4	337.3	3.81	3.62	2.78	14.49
5	.14	.13	.10	.36	.34	.26	297.0	283.7	212.1	1.93	1.84	1.38	9.09
6	.07	.07	.13	.13	.12	.24	227.4	215.6	413.5	1.46	1.38	2.65	17.78
7	.05	.05	.12	.15	.14	.36	190.0	181.8	452.4	1.00	.96	2.38	19.43
8	.06	.06	.08	.11	.10	.15	239.6	222.2	332.8	1.52	1.41	2.11	14.15
EIGHT BAG TOTAL	2.58			9.03			1961.9			12.59			
505 SEC BAG MASS	2.33			8.70			2012.0			12.76			
PERCENT DIFFERENCE	-10.73			-3.79			2.49			1.33			

TEST NO. 21

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.43	1.36	4.09	4.79	4.55	13.69	192.3	182.6	549.5	1.07	1.02	3.06	24.65
2	.60	.57	.83	1.19	1.13	1.65	205.7	195.6	285.7	1.03	.98	1.43	12.35
3	.34	.32	1.63	1.56	1.48	6.50	178.8	169.2	745.2	.64	.61	2.67	32.29
4	.28	.27	.20	2.03	1.96	1.48	501.9	483.3	366.3	4.00	3.85	2.92	15.79
5	.13	.12	.09	.18	.17	.13	302.1	284.6	215.8	2.02	1.90	1.44	9.24
6	.07	.07	.13	.29	.27	.51	223.8	213.2	407.0	1.42	1.35	2.58	17.52
7	.06	.06	.14	.14	.14	.33	184.0	178.4	438.1	1.06	1.03	2.52	18.82
8	.08	.07	.11	.58	.53	.81	246.2	226.6	342.0	1.63	1.50	2.26	14.59
EIGHT BAG TOTAL	3.04			10.75			2034.9			12.87			
505 SEC BAG MASS	2.84			10.61			2066.1			12.96			
PERCENT DIFFERENCE	-7.04			-1.32			1.51			.69			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-9. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 1 HR SOAK

1976 Plymouth Fury

TEST NO. 18

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.68	1.61	4.80	7.58	7.24	21.66	195.7	187.0	559.2	1.10	1.05	3.14	25.68
2	.63	.59	.88	1.35	1.27	1.98	188.4	177.8	261.7	.98	.92	1.36	11.35
3	.53	.51	2.21	1.64	1.57	6.83	171.5	163.9	714.6	.62	.59	2.58	31.09
4	.26	.25	.19	.91	.87	.66	487.8	464.6	356.1	4.17	3.97	3.04	15.30
5	.13	.12	.09	.19	.18	.14	304.0	287.7	217.2	2.03	1.92	1.45	9.29
6	.06	.06	.11	.10	.10	.18	231.3	220.9	420.5	1.43	1.37	2.60	18.07
7	.06	.06	.14	.13	.13	.31	194.6	188.0	463.4	1.02	.99	2.43	19.90
8	.06	.06	.08	.14	.13	.19	245.5	228.4	341.0	1.64	1.53	2.28	14.50
EIGHT BAG TOTAL	3.41			12.04			2019.0			12.99			
505 SEC BAG MASS	3.14			12.10			2054.0			13.15			
PERCENT DIFFERENCE	-8.60			.50			1.71			1.22			

TEST NO. 19

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.28	1.21	3.66	7.13	6.75	20.37	203.8	192.9	582.3	1.11	1.05	3.17	26.42
2	.58	.55	.81	1.02	.96	1.42	175.6	165.2	244.0	.67	.63	.93	10.56
3	.52	.50	2.17	1.32	1.27	5.50	169.9	163.7	708.1	.75	.72	3.12	30.72
4	.22	.20	.16	.51	.47	.37	464.4	430.7	339.0	3.98	3.69	2.91	14.54
5	.12	.12	.09	.21	.20	.15	286.5	279.0	204.6	1.68	1.64	1.20	8.76
6	.07	.07	.13	.09	.09	.16	224.8	217.9	408.8	1.39	1.35	2.53	17.57
7	.06	.06	.14	.26	.24	.62	196.4	184.1	467.7	.95	.89	2.26	20.11
8	.06	.06	.08	.18	.17	.25	240.5	224.7	334.0	1.39	1.30	1.93	14.21
EIGHT BAG TOTAL	2.91			10.72			1962.0			11.92			
505 SEC BAG MASS	3.14			10.88			2018.3			11.89			
PERCENT DIFFERENCE	7.32			1.47			2.79			-.25			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-10. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 2 HR SOAK

1976 Plymouth Fury

TEST NO. 16

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.23	3.05	9.23	43.70	41.23	124.86	189.0	178.3	540.1	.58	.55	1.66	32.31
2	.89	.85	1.24	2.53	2.41	3.51	210.9	200.5	292.9	.96	.91	1.33	12.83
3	.76	.73	3.17	2.13	2.05	8.87	178.6	171.7	744.1	.66	.63	2.75	32.61
4	.24	.23	.18	1.62	1.53	1.18	508.1	480.8	370.9	3.93	3.72	2.87	15.96
5	.16	.15	.11	.29	.28	.21	314.3	298.9	224.5	2.02	1.92	1.44	9.61
6	.08	.08	.15	.46	.44	.84	232.6	222.3	423.0	1.42	1.36	2.58	18.23
7	.06	.06	.14	.29	.27	.69	194.6	184.5	463.4	.96	.91	2.29	19.93
8	.06	.06	.08	.15	.14	.21	237.0	222.2	329.2	1.42	1.33	1.97	14.00
EIGHT BAG TOTAL	5.49			51.17			2065.2			11.95			
505 SEC BAG MASS	5.09			45.12			2097.6			12.49			
PERCENT DIFFERENCE	-7.66			-13.41			1.55			4.32			

TEST NO. 17

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.01	2.88	8.60	42.43	40.54	121.23	189.5	181.1	541.4	.64	.61	1.83	32.05
2	.74	.70	1.03	2.32	2.20	3.22	200.2	189.5	278.1	1.06	1.00	1.47	12.16
3	.67	.64	2.79	1.98	1.90	8.25	173.1	165.9	721.1	.67	.64	2.79	31.54
4	.27	.26	.20	1.62	1.53	1.18	486.1	460.0	354.8	4.02	3.80	2.93	15.28
5	.16	.15	.11	.41	.39	.29	310.7	292.6	221.9	2.02	1.90	1.44	9.51
6	.06	.06	.11	.11	.10	.20	232.7	221.2	423.1	1.39	1.32	2.53	18.19
7	.06	.06	.14	.41	.39	.98	202.5	194.7	482.2	1.01	.97	2.40	20.75
8	.05	.05	.07	.12	.11	.17	248.2	232.0	344.8	1.57	1.47	2.18	14.66
EIGHT BAG TOTAL	5.02			49.40			2043.1			12.38			
505 SEC BAG MASS	4.97			47.57			2062.0			12.73			
PERCENT DIFFERENCE	-1.01			-3.85			.92			2.75			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-11. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 4 HR SOAK
1976 Plymouth Fury

TEST NO. 14

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	2.81	2.76	8.03	53.82	52.85	153.77	229.5	225.4	655.7	.66	.65	1.69	38.95
2	.86	.82	1.19	4.90	4.67	6.81	226.0	215.6	313.9	1.01	.96	1.40	13.94
3	1.00	.44	4.17	2.50	2.35	10.42	191.7	180.3	798.8	.70	.66	2.92	35.17
4	.37	.35	.27	3.93	3.75	2.87	546.3	521.1	398.8	3.86	3.68	2.82	17.28
5	.17	.16	.12	.27	.26	.19	322.7	304.9	230.5	1.86	1.76	1.33	9.87
6	.10	.10	.18	.13	.12	.24	247.8	235.6	450.5	1.69	1.61	3.07	19.38
7	.12	.12	.29	.96	.92	2.29	196.7	189.1	468.2	.94	.90	2.24	20.26
8	.07	.06	.10	.09	.08	.13	267.7	247.9	371.9	1.73	1.60	2.40	15.81
EIGHT BAG TOTAL	5.50			66.60			2228.4			12.45			
505 SEC BAG MASS	5.34			62.69			2210.7			12.07			
PERCENT DIFFERENCE	-2.04			-6.24			-.80			-3.15			

TEST NO. 15

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	2.49	2.43	7.11	54.11	52.70	154.60	215.1	209.5	614.5	.57	.56	1.63	37.15
2	.90	.86	1.25	5.08	4.83	7.06	203.0	193.0	281.9	.81	.77	1.13	12.61
3	.99	.93	4.12	2.88	2.70	12.00	179.1	168.2	746.2	.65	.61	2.71	33.03
4	.38	.36	.28	5.33	5.12	3.89	505.6	485.3	369.0	3.63	3.48	2.65	16.08
5	.17	.16	.12	.30	.28	.21	315.0	297.1	225.0	2.11	1.99	1.51	9.64
6	.08	.08	.15	.09	.09	.16	236.2	226.1	429.5	1.45	1.39	2.64	18.47
7	.06	.06	.14	.10	.09	.24	198.1	186.8	471.6	.98	.92	2.33	20.25
8	.08	.08	.11	.12	.11	.17	272.2	255.6	378.0	1.79	1.68	2.49	16.07
EIGHT BAG TOTAL	5.15			68.01			2124.1			11.99			
505 SEC BAG MASS	4.80			59.04			2150.3			11.88			
PERCENT DIFFERENCE	-7.29			-15.19			1.22			-.93			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-12. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 8 HR SOAK
1976 Plymouth Fury

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TEST NO. 12

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.86	2.78	8.17	56.72	55.07	162.06	223.7	217.2	639.3	.55	.53	1.57	38.82
2	1.00	.97	1.34	9.32	9.05	12.94	208.2	202.2	289.2	.85	.83	1.18	13.33
3	1.05	.99	4.37	4.56	4.30	19.00	187.0	176.1	779.0	.49	.46	2.04	34.93
4	.36	.34	.26	4.14	3.94	3.02	526.7	500.8	384.5	3.83	3.64	2.80	16.68
5	.24	.23	.17	.48	.45	.34	333.6	316.2	238.3	2.26	2.14	1.61	10.22
6	.07	.07	.13	.11	.10	.20	251.0	236.8	456.3	1.42	1.34	2.58	19.62
7	.12	.11	.29	1.03	.99	2.45	212.3	203.2	505.5	.98	.94	2.33	21.87
8	.07	.06	.10	.31	.29	.43	270.8	250.3	376.1	1.51	1.40	2.10	16.01
EIGHT BAG TOTAL	5.77			76.67			2213.4			11.89			
505 SEC BAG MASS	5.78			75.53			2259.4			11.83			
PERCENT DIFFERENCE	.17			-1.51			2.04			-.51			

TEST NO. 13

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.75	2.59	7.86	57.31	53.90	163.74	240.0	225.7	685.8	.68	.64	1.94	40.86
2	1.11	1.07	1.54	8.15	7.82	11.32	227.0	217.9	315.3	.91	.87	1.26	14.35
3	1.38	1.31	5.75	5.08	4.82	21.17	197.9	187.5	824.4	.58	.55	2.42	37.18
4	.41	.39	.30	5.64	5.35	4.12	564.0	534.6	411.7	4.37	4.14	3.19	17.92
5	.21	.20	.15	.42	.40	.30	325.0	312.0	232.1	2.12	2.04	1.51	9.95
6	.09	.09	.16	.14	.13	.25	243.5	231.2	442.8	1.61	1.53	2.93	19.04
7	.07	.07	.17	.43	.41	1.02	206.9	197.9	492.5	.95	.91	2.26	21.20
8	.08	.07	.11	.23	.21	.32	273.8	255.5	380.3	1.64	1.53	2.28	16.18
EIGHT BAG TOTAL	6.10			77.40			2278.1			12.86			
505 SEC BAG MASS	5.99			74.13			2296.1			12.76			
PERCENT DIFFERENCE	-1.84			-4.41			.78			-.78			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-13. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 16 HR SOAK
1976 Plymouth Fury

TEST NO. 1

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	3.96	3.75	11.31	70.32	66.65	200.91	218.9	207.5	625.4	.51	.48	1.46	41.24
2	1.14	1.08	1.58	12.46	11.75	17.31	252.0	237.8	350.0	.84	.79	1.17	16.23
3	1.21	1.15	5.04	7.21	6.88	30.04	239.9	228.9	999.7	.43	.41	1.79	45.12
4	.41	.39	.30	5.91	5.64	4.31	573.6	547.2	418.7	4.09	3.90	2.99	18.24
5	.16	.15	.11	.37	.35	.26	338.2	320.1	241.6	2.26	2.14	1.61	10.35
6	.06	.06	.11	.17	.16	.31	247.9	238.0	450.7	1.22	1.17	2.22	19.38
7	.06	.06	.14	.57	.54	1.36	210.6	198.7	501.5	.86	.81	2.05	21.60
8	.05	.05	.07	.17	.16	.24	274.9	259.4	381.9	1.42	1.34	1.97	16.24
EIGHT BAG TOTAL	7.05			97.18			2356.2			11.63			
505 SEC BAG MASS	6.75			90.97			2281.8			11.57			
PERCENT DIFFERENCE	-4.44			-6.83			-3.26			-.52			

TEST NO. 2

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	3.18	3.03	9.09	68.61	65.45	196.03	244.6	233.4	699.0	.49	.47	1.40	43.72
2	1.19	1.15	1.65	9.88	9.52	13.72	238.5	229.7	331.3	.71	.68	.99	15.20
3	1.41	1.33	5.87	4.21	3.96	17.54	206.0	193.7	858.2	.45	.42	1.87	38.39
4	.36	.34	.26	6.43	6.15	4.69	561.7	537.5	410.0	4.04	3.87	2.95	17.88
5	.14	.13	.10	.25	.24	.18	336.7	319.6	240.5	2.25	2.14	1.61	10.29
6	.08	.08	.15	.19	.18	.35	243.6	232.8	443.0	1.37	1.31	2.49	19.06
7	.09	.08	.21	.63	.59	1.50	199.3	187.7	474.5	.96	.90	2.29	20.47
8	.08	.07	.11	.28	.26	.39	264.8	247.5	367.7	1.51	1.41	2.10	15.65
EIGHT BAG TOTAL	6.53			90.48			2295.2			11.78			
505 SEC BAG MASS	6.17			84.68			2291.9			12.29			
PERCENT DIFFERENCE	-5.83			-6.85			-.14			4.15			

TEST NO. 10

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	3.60	3.42	10.29	60.73	57.75	173.51	259.9	247.1	742.5	.56	.53	1.60	44.23
2	1.55	1.47	2.15	9.70	9.18	13.47	244.9	231.7	340.1	.78	.74	1.08	15.63
3	.98	.93	4.08	2.85	2.71	11.87	218.3	207.2	909.5	.56	.53	2.33	39.95
4	.47	.45	.34	7.73	7.41	5.64	585.2	560.9	427.2	4.63	4.44	3.38	18.69
5	.28	.27	.20	.42	.40	.30	341.7	323.9	244.1	2.21	2.09	1.58	10.47
6	.09	.09	.16	.06	.06	.11	248.4	237.3	451.6	1.44	1.38	2.62	19.41
7	.12	.11	.29	.71	.68	1.69	198.5	189.6	472.5	.85	.81	2.02	20.40
8	.07	.07	.10	.10	.09	.14	266.1	249.8	369.6	1.49	1.40	2.07	15.71
EIGHT BAG TOTAL	7.16			82.30			2362.9			12.52			
505 SEC BAG MASS	6.74			85.38			2385.6			12.67			
PERCENT DIFFERENCE	-6.23			3.61			.95			1.18			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-14. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 36 HR SOAK

1976 Plymouth Fury

TEST NO. 9

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.64	3.46	10.40	72.83	69.14	208.09	246.1	233.6	703.0	.52	.49	1.49	44.87
2	1.29	1.23	1.79	12.93	12.35	17.96	239.0	228.4	332.0	.87	.83	1.21	15.53
3	1.34	1.27	5.58	8.00	7.59	33.33	219.4	208.3	914.1	.50	.47	2.08	41.78
4	.48	.46	.35	6.76	6.44	4.93	596.0	567.7	435.1	4.41	4.20	3.22	18.98
5	.23	.21	.16	.19	.18	.14	350.0	327.1	250.0	2.10	1.96	1.50	10.71
6	.11	.11	.20	.18	.17	.33	246.9	238.1	448.9	1.42	1.37	2.58	19.31
7	.11	.11	.26	.27	.26	.64	198.9	190.6	473.5	.90	.86	2.14	20.37
8	.11	.10	.15	.08	.07	.11	272.2	252.4	378.0	1.56	1.45	2.17	16.08
EIGHT BAG TOTAL	7.31			101.24			2368.4			12.28			
505 SEC BAG MASS	6.96			100.58			2435.1			12.17			
PERCENT DIFFERENCE	-5.03			-.66			2.74			-.90			

TEST NO. 11

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.75	3.61	10.71	73.30	70.48	209.43	244.6	235.2	698.9	.50	.48	1.43	44.83
2	1.34	1.28	1.86	19.93	19.10	27.68	247.2	236.9	343.3	.68	.65	.94	16.67
3	.90	.85	3.75	7.19	6.78	29.96	222.9	210.3	928.7	.50	.47	2.08	41.93
4	.44	.42	.32	8.76	8.36	6.39	600.7	573.0	438.5	4.19	4.00	3.06	19.22
5	.21	.20	.15	.29	.27	.21	345.0	325.5	246.4	2.04	1.92	1.46	10.56
6	.07	.07	.13	.08	.08	.15	251.5	243.0	457.3	1.22	1.18	2.22	19.65
7	.08	.08	.19	.61	.58	1.45	210.2	200.2	500.4	.88	.84	2.10	21.57
8	.05	.05	.07	.07	.06	.10	275.7	253.7	382.9	1.54	1.42	2.14	16.27
EIGHT BAG TOTAL	6.84			110.23			2397.8			11.55			
505 SEC BAG MASS	6.63			103.19			2424.4			12.08			
PERCENT DIFFERENCE	-3.17			-6.87			1.10			4.39			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE C-15. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 10 MINUTE SOAK

1976 Plymouth Fury

TEST NO. 7

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.59	.53	.98	3.47	3.10	5.78	265.7	237.6	442.8	1.66	1.48	2.77	19.58
2	.20	.19	.54	1.53	1.48	4.14	252.2	243.6	681.5	1.46	1.41	3.95	29.44
3	.11	.10	.17	.19	.18	.29	219.4	206.6	332.4	1.03	.97	1.56	14.24
4	.09	.09	.23	.20	.19	.51	187.6	179.8	481.0	.78	.75	2.00	20.80
5	.07	.06	.24	.04	.04	.14	177.8	164.9	613.2	.47	.44	1.62	26.25
6	.08	.08	.21	.07	.07	.18	206.2	199.9	528.7	1.11	1.08	2.85	22.84
7	.10	.09	.23	.30	.28	.70	230.5	217.8	536.0	1.30	1.23	3.02	22.73
8	.08	.08	.14	.11	.10	.20	187.7	176.5	335.1	.76	.71	1.36	14.26
EIGHT BAG TOTAL	1.32			5.91			1727.0			8.57			
505 SEC BAG MASS	1.35			6.15			1734.2			8.57			
PERCENT DIFFERENCE	2.22			3.90			.41			.00			

TEST NO. 8

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.66	.62	1.10	4.45	4.20	7.42	253.8	239.8	423.0	1.84	1.74	3.07	18.85
2	.17	.16	.46	.94	.90	2.54	274.4	261.7	741.5	1.71	1.63	4.62	31.88
3	.10	.10	.15	.15	.14	.23	220.8	210.0	334.6	1.00	.95	1.52	14.33
4	.07	.07	.18	.30	.29	.77	199.2	188.6	498.0	.87	.84	2.23	21.55
5	.05	.05	.17	.06	.06	.21	172.0	161.5	593.0	.49	.46	1.69	25.39
6	.07	.07	.18	.14	.13	.36	209.9	200.9	538.3	1.16	1.11	2.97	23.26
7	.07	.07	.16	.15	.14	.35	216.3	206.6	503.0	1.54	1.47	3.58	21.30
8	.07	.06	.13	.15	.14	.27	191.6	177.7	342.2	.83	.77	1.48	14.56
EIGHT BAG TOTAL	1.26			6.34			1733.0			9.44			
505 SEC BAG MASS	1.10			6.45			1711.1			9.22			
PERCENT DIFFERENCE	-14.55			1.71			-1.28			-2.39			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

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TABLE C-16. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 16 HR SOAK

1976 Plymouth Fury

TEST NO. 4

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.91	2.61	4.85	66.04	59.32	110.07	286.3	257.1	477.1	.89	.80	1.48	28.63
2	1.84	1.72	4.97	10.84	10.15	29.30	329.7	308.6	891.1	1.13	1.06	3.05	40.67
3	.85	.78	1.29	13.70	12.61	20.76	258.3	237.7	391.4	1.12	1.03	1.70	18.28
4	.15	.14	.38	.46	.43	1.18	200.6	188.6	514.3	.56	.53	1.44	22.31
5	.12	.11	.41	.45	.42	1.55	183.2	172.9	631.9	.39	.37	1.34	27.17
6	.11	.11	.28	.18	.17	.46	230.3	220.3	590.4	1.04	1.00	2.67	25.52
7	.12	.11	.28	.19	.18	.44	224.7	212.6	522.5	1.19	1.13	2.77	22.15
8	.11	.10	.20	.22	.21	.39	195.9	184.2	349.8	.76	.71	1.36	14.90
EIGHT BAG TOTAL	6.21			92.08			1909.0			7.08			
505 SEC BAG MASS	5.74			80.86			1888.4			7.10			
PERCENT DIFFERENCE	-8.19			-13.88			-1.09			.28			

TEST NO. 5

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.53	3.24	5.88	81.65	74.91	136.08	270.0	247.8	450.1	.87	.80	1.45	29.37
2	1.66	1.65	4.49	17.58	17.52	47.51	315.5	314.5	852.8	1.23	1.23	3.32	40.19
3	.89	.82	1.35	15.23	14.10	23.08	254.8	235.9	386.0	.80	.74	1.21	18.22
4	.17	.16	.44	.31	.30	.79	153.6	148.0	394.0	.52	.50	1.33	17.10
5	.16	.15	.55	.49	.46	1.69	144.7	136.3	498.9	.49	.46	1.69	21.51
6	.14	.13	.36	.25	.24	.64	172.1	163.6	441.2	.92	.87	2.36	19.12
7	.14	.13	.33	.20	.19	.47	186.2	177.1	433.1	.97	.92	2.26	18.37
8	.14	.13	.25	.40	.37	.71	160.3	149.3	286.2	.68	.63	1.21	12.23
EIGHT BAG TOTAL	6.83			116.11			1657.2			6.48			
505 SEC BAG MASS	6.13			105.50			1835.0			6.46			
PERCENT DIFFERENCE	-11.42			-10.06			9.69			-.31			

TEST NO. 6

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.31	3.11	5.52	40.27	84.76	150.45	270.5	254.0	450.9	.71	.67	1.18	30.32
2	1.05	1.02	2.84	12.04	11.65	32.54	316.6	306.4	855.7	1.26	1.22	3.41	39.09
3	.69	.66	1.05	8.79	8.34	13.32	238.0	225.9	360.6	.84	.80	1.27	16.44
4	.17	.16	.44	.52	.50	1.33	204.1	199.7	523.3	.68	.65	1.74	22.71
5	.10	.09	.34	.52	.49	1.79	182.4	172.9	629.1	.41	.39	1.41	27.06
6	.09	.09	.23	.26	.25	.67	227.1	216.6	582.3	1.16	1.11	2.97	25.10
7	.10	.09	.23	.56	.53	1.30	226.8	215.0	527.5	1.06	1.00	2.47	22.41
8	.07	.07	.13	.15	.14	.27	203.4	193.8	363.3	.94	.90	1.68	15.46
EIGHT BAG TOTAL	5.58			113.11			1869.0			7.06			
505 SEC BAG MASS	5.14			102.68			1784.2			6.90			
PERCENT DIFFERENCE	-9.14			-10.16			-4.75			-2.32			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

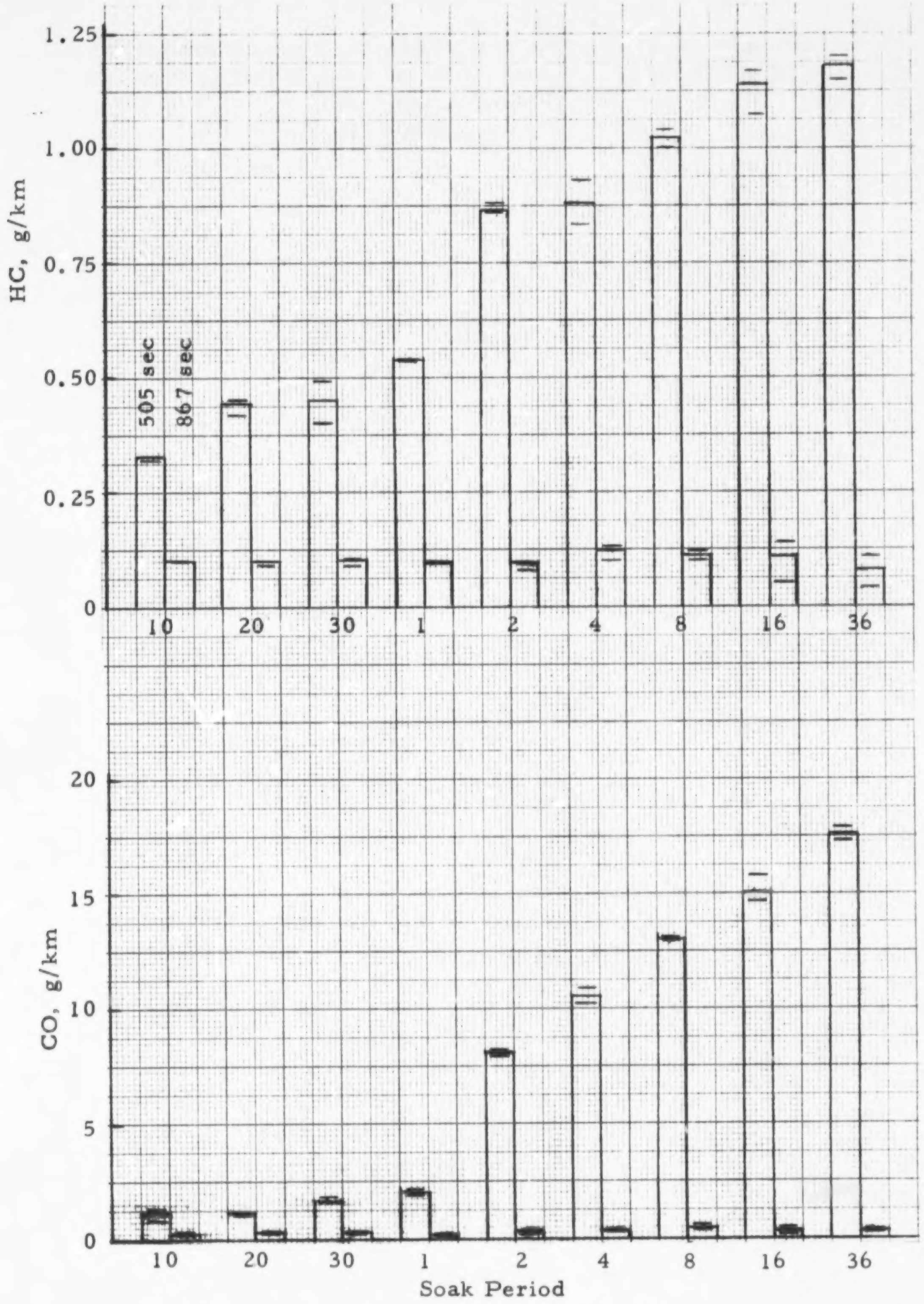

FIGURE C-1. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Plymouth Fury

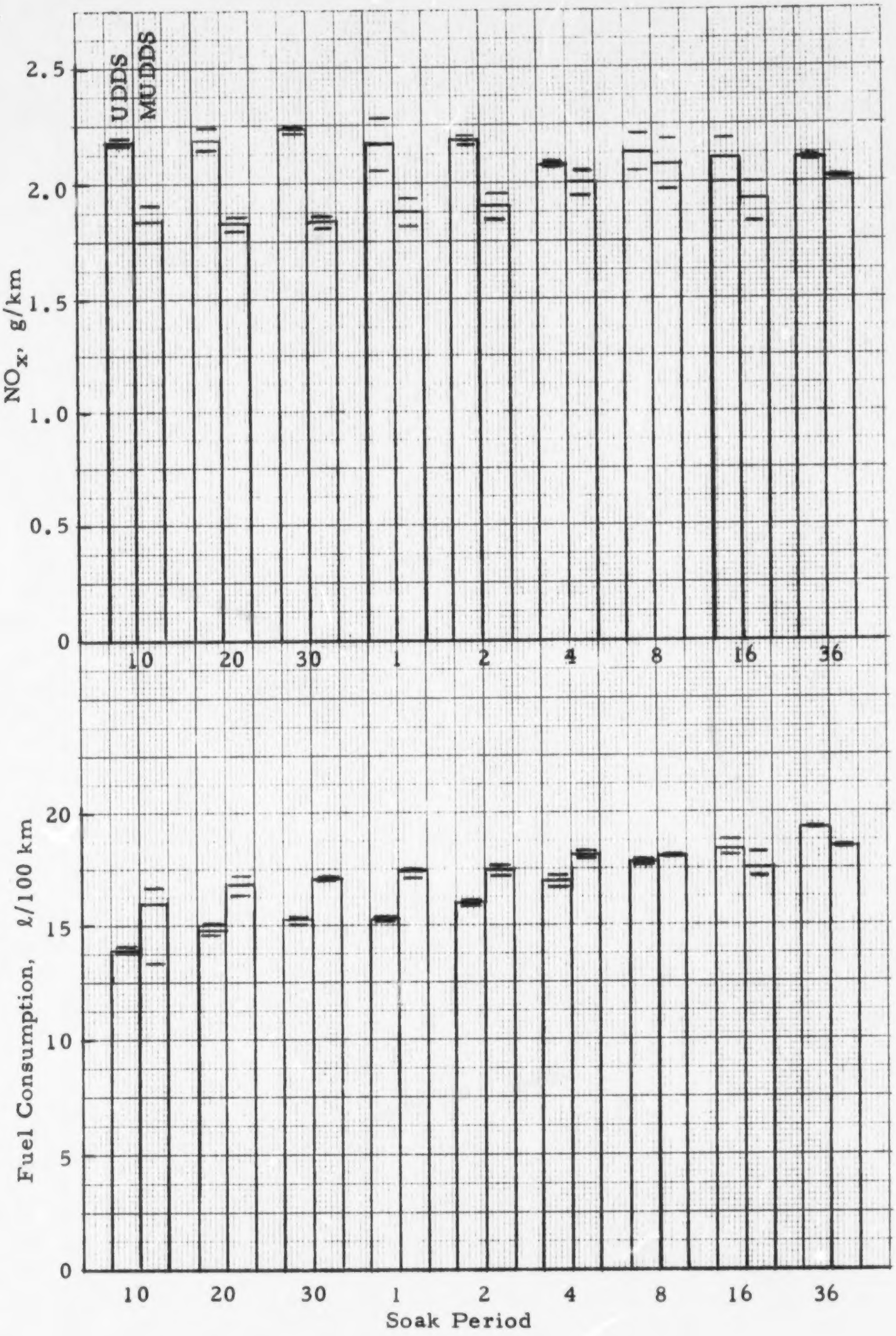

FIGURE C-2. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Plymouth Fury

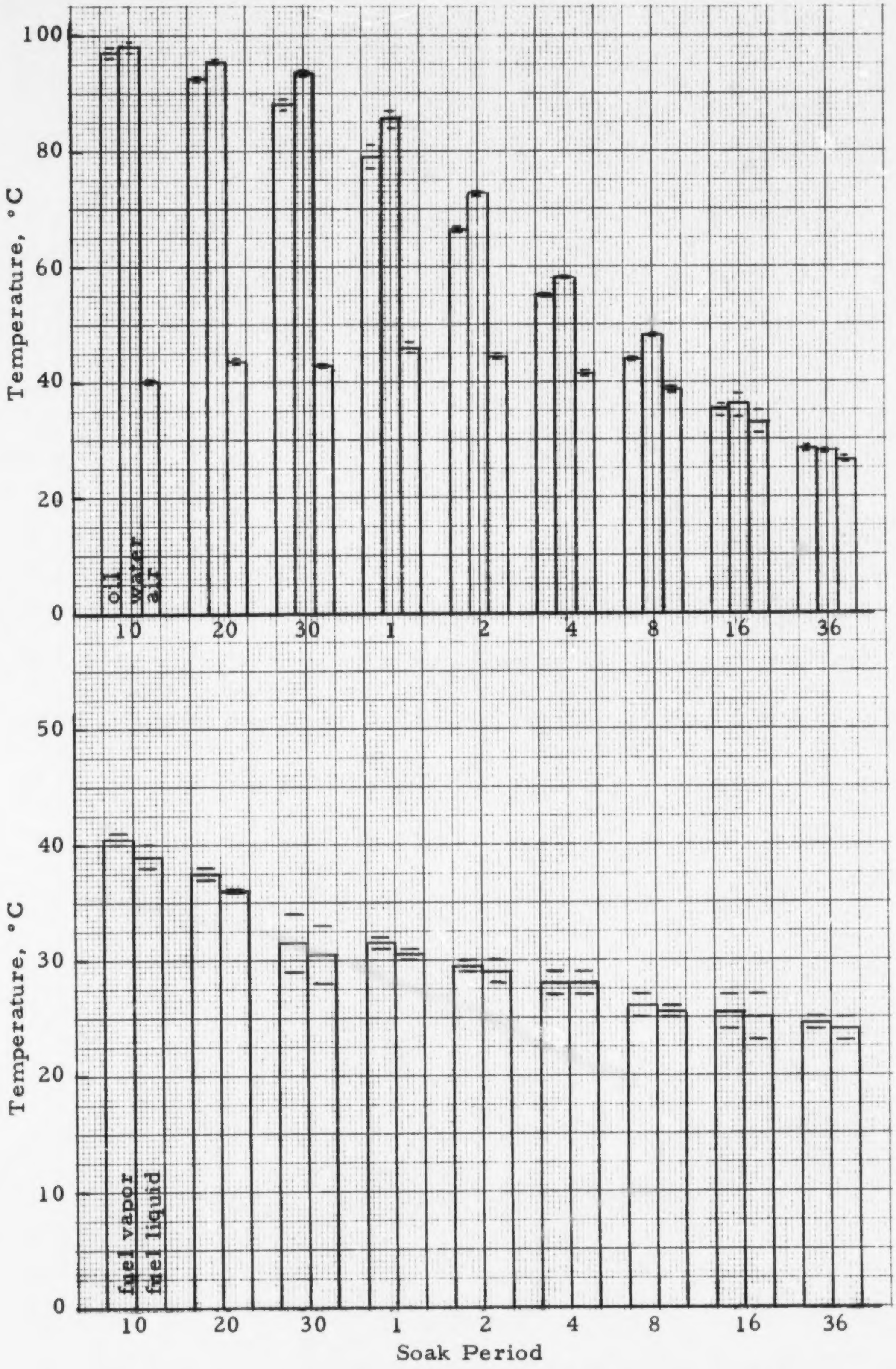

FIGURE C-3. AVERAGE TEMPERATURES DURING VARIOUS LENGTH SOAK PERIODS PRIOR TO DYNAMOMETER TESTS
1976 Plymouth Fury

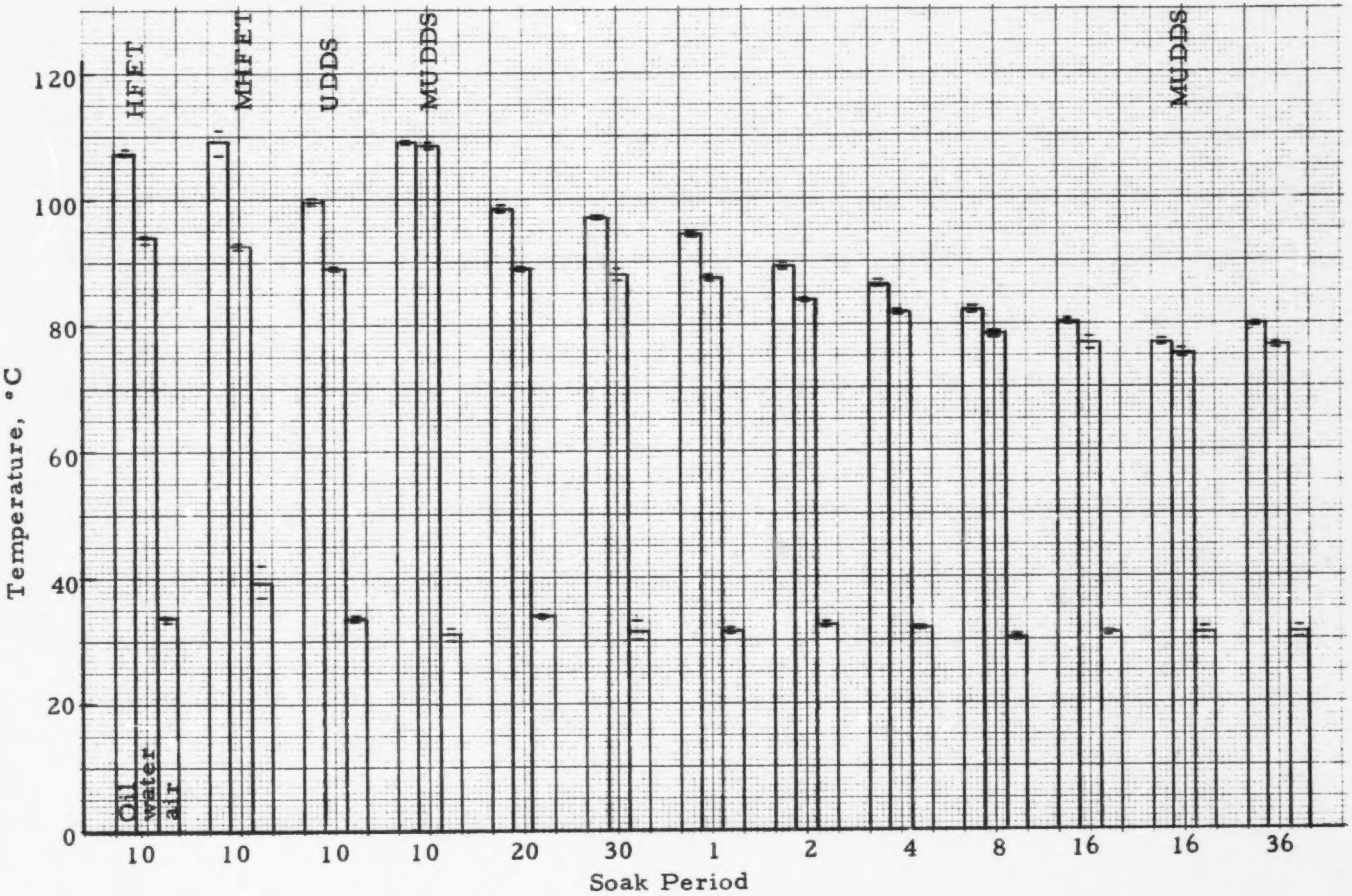

FIGURE C-4. AVERAGE OIL PAN, ENGINE WATER OUT, AND CARBURETOR INLET AIR TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Plymouth Fury

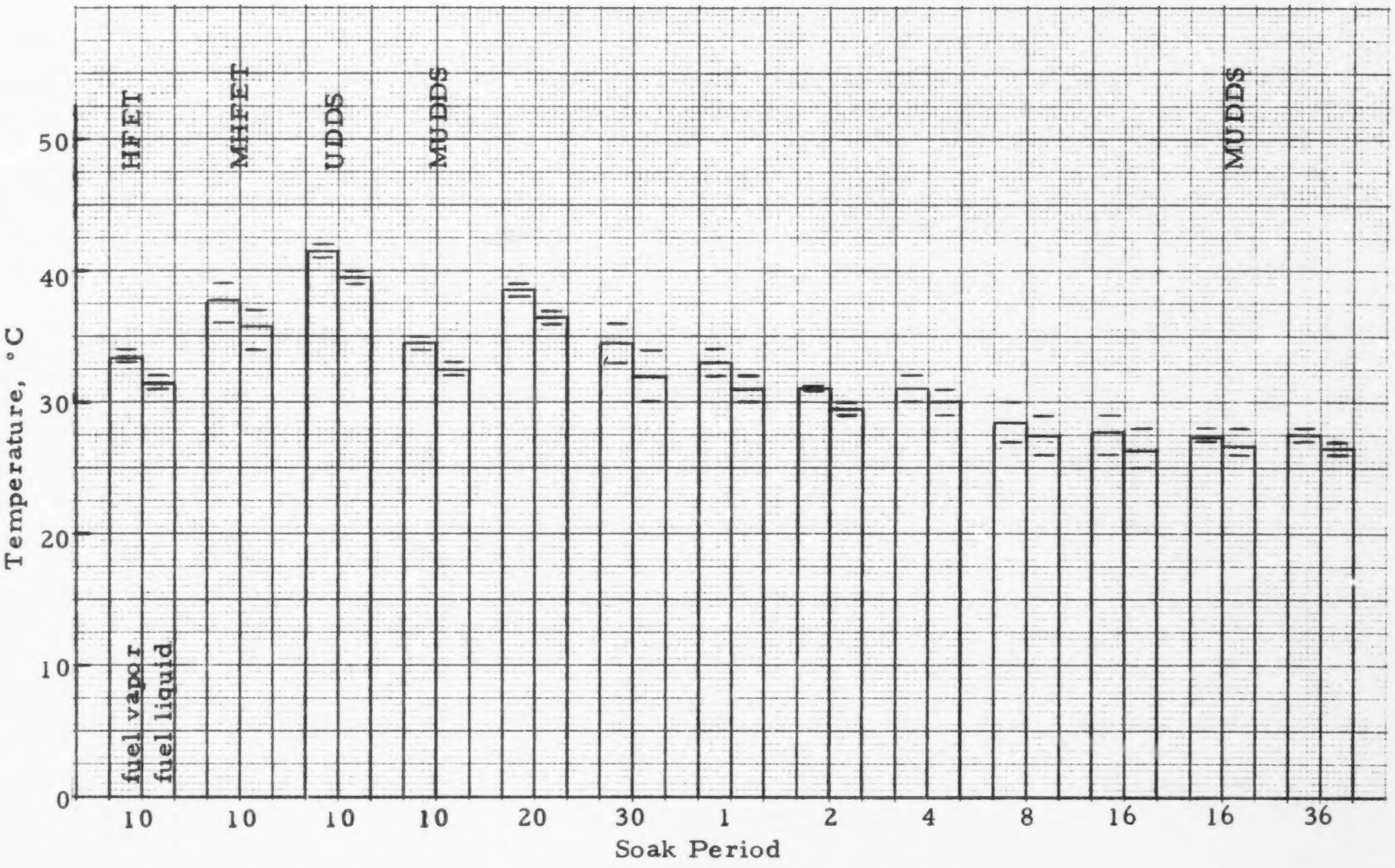

FIGURE C-5. AVERAGE FUEL TANK VAPOR AND FUEL TANK LIQUID TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Plymouth Fury

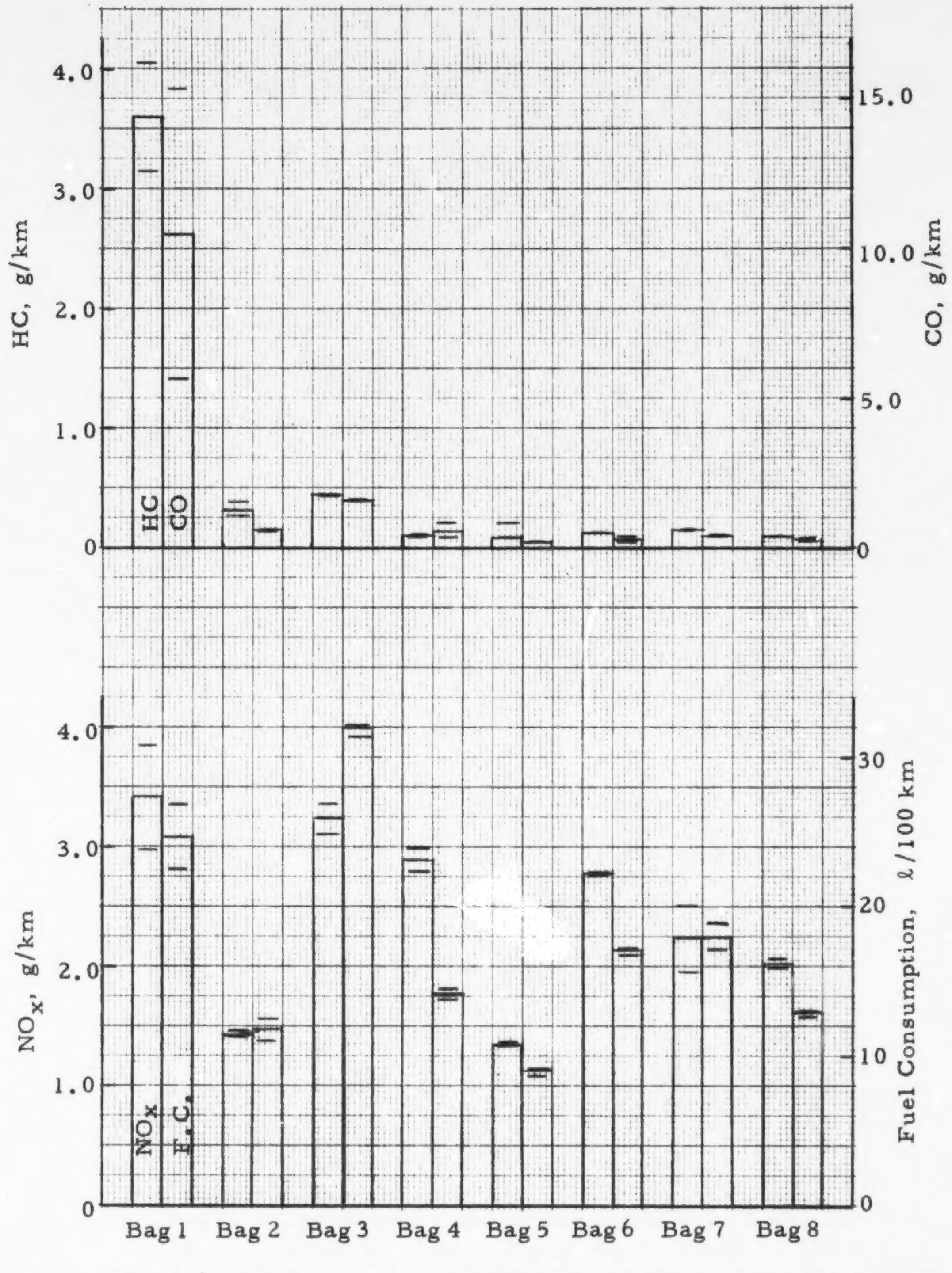

FIGURE C-6. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 10 MINUTE SOAK
1976 Plymouth Fury

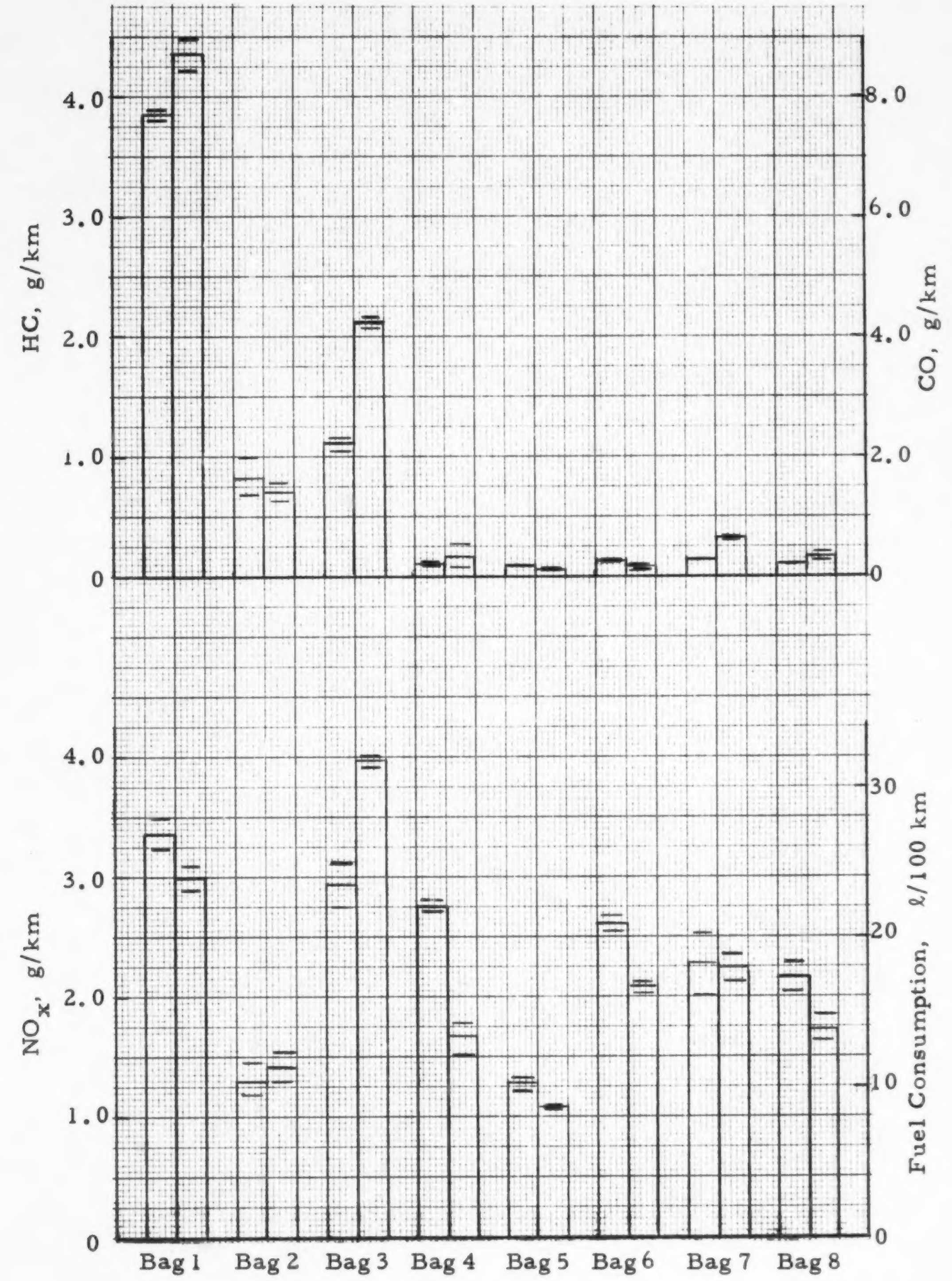

FIGURE C-7. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 20 MINUTE SOAK
1976 Plymouth Fury

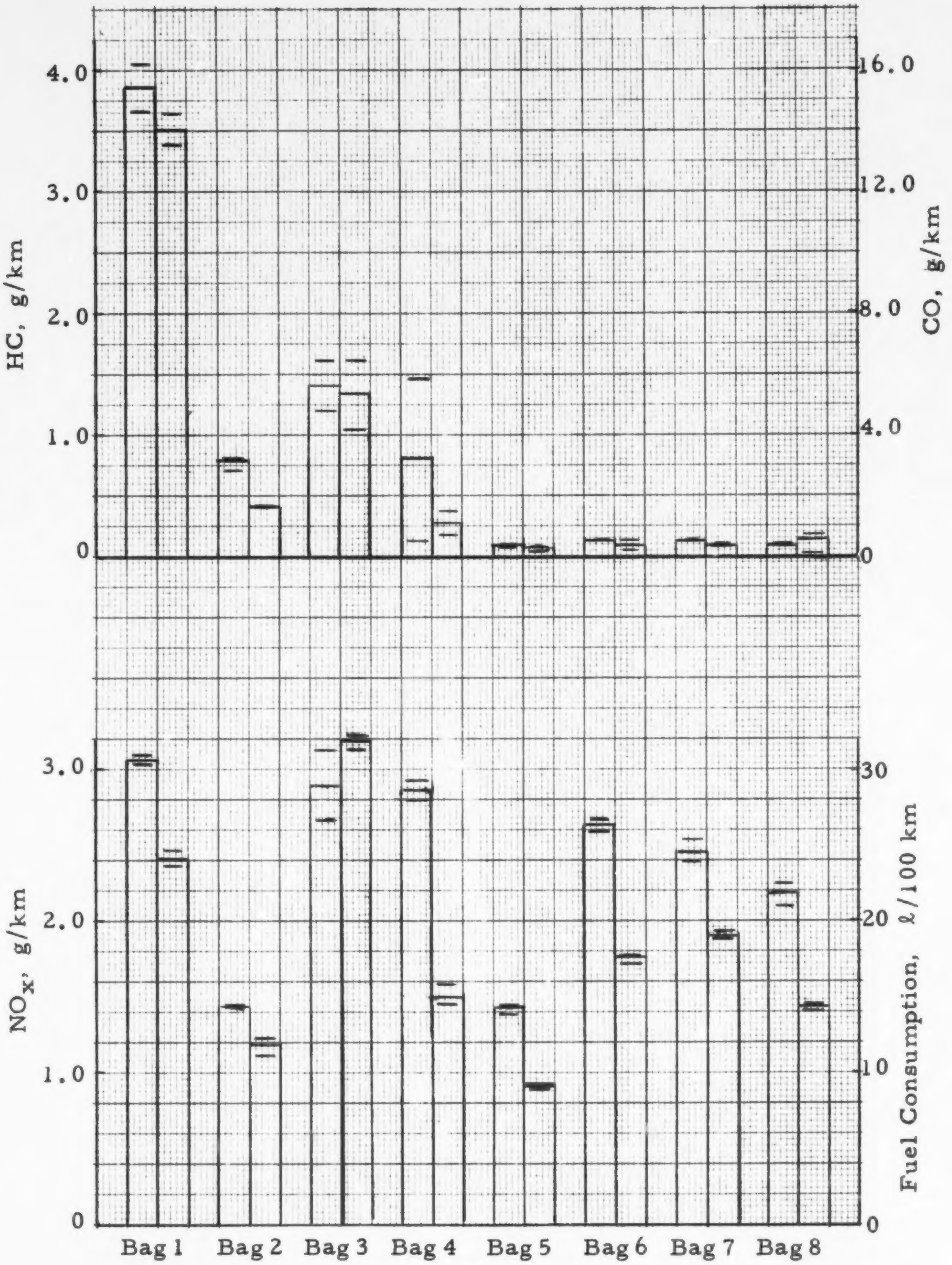

FIGURE C-8. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 30 MINUTE SOAK
1976 Plymouth Fury

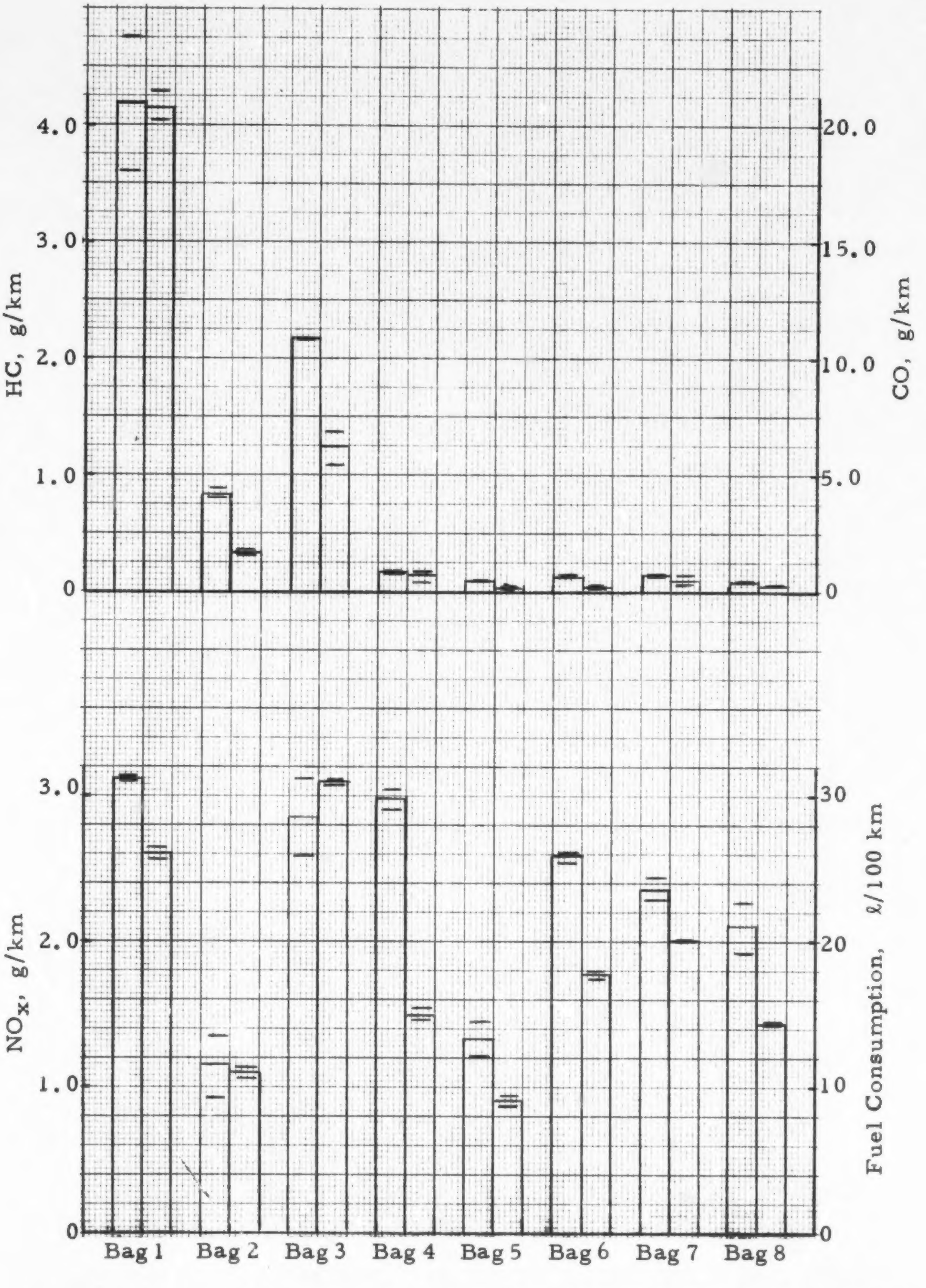

FIGURE C-9. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 1 HR SOAK
1976 Plymouth Fury

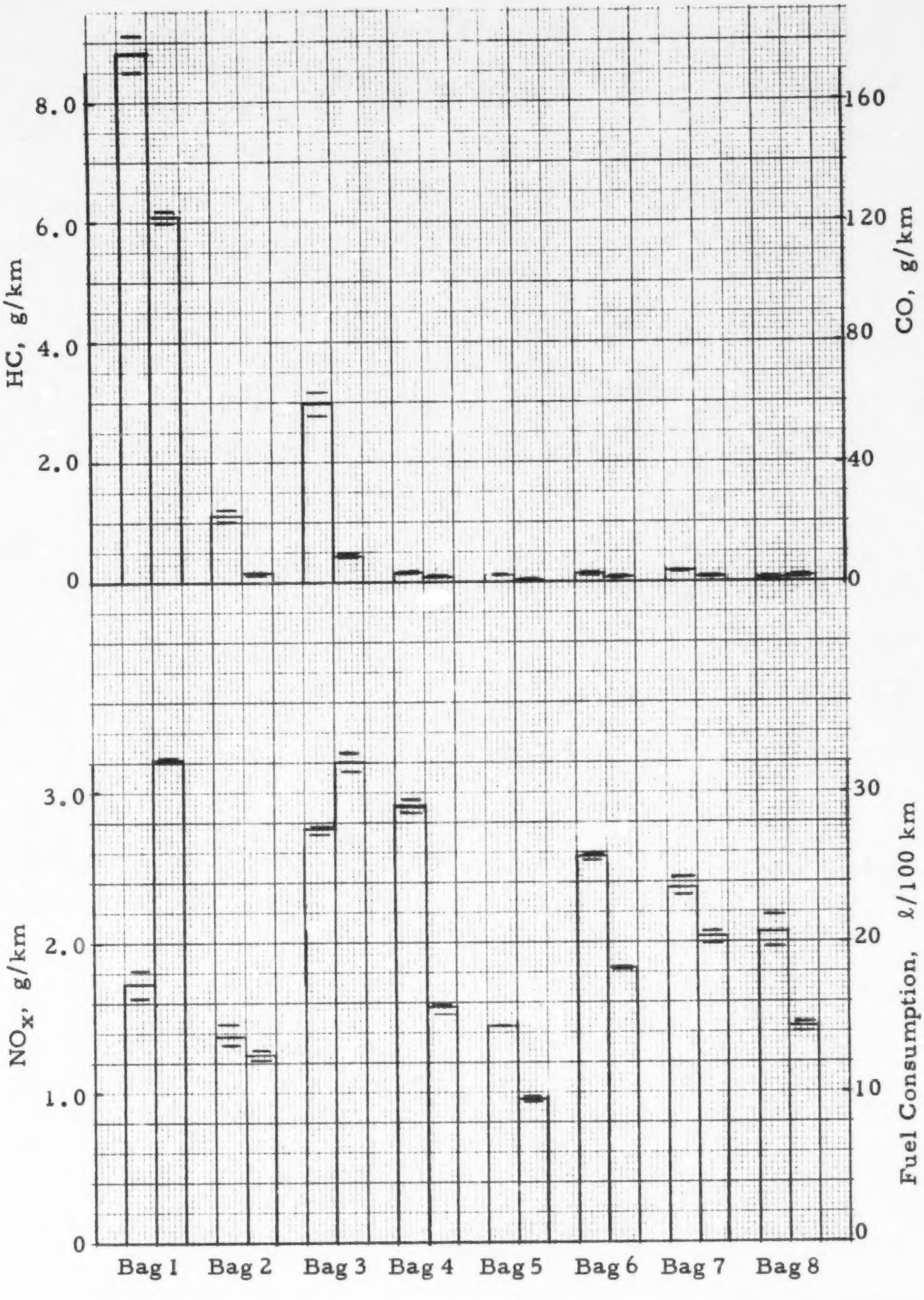

FIGURE C-10. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 2 HR SOAK
1976 Plymouth Fury

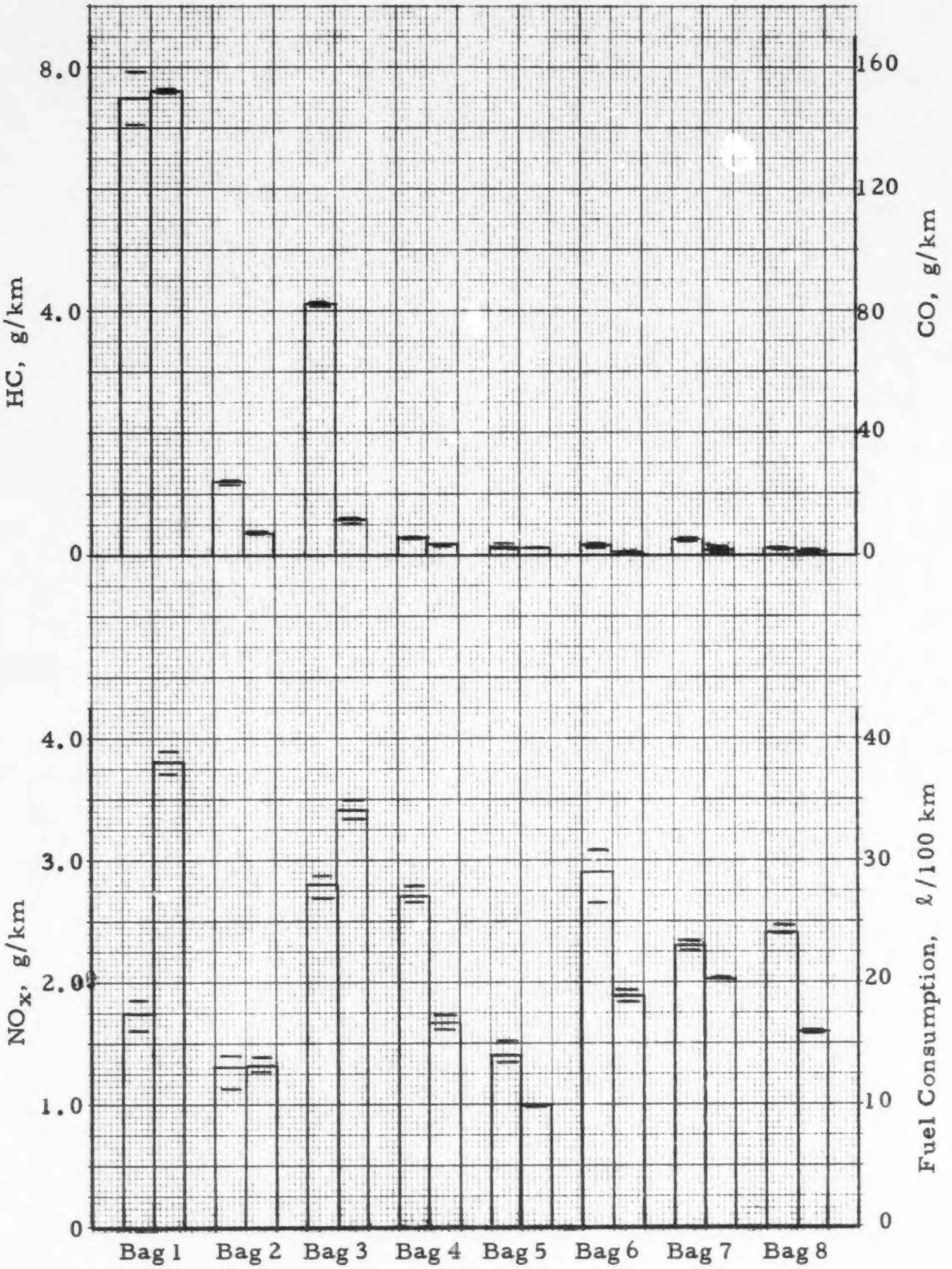

FIGURE C-11. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 4 HR SOAK
1976 Plymouth Fury

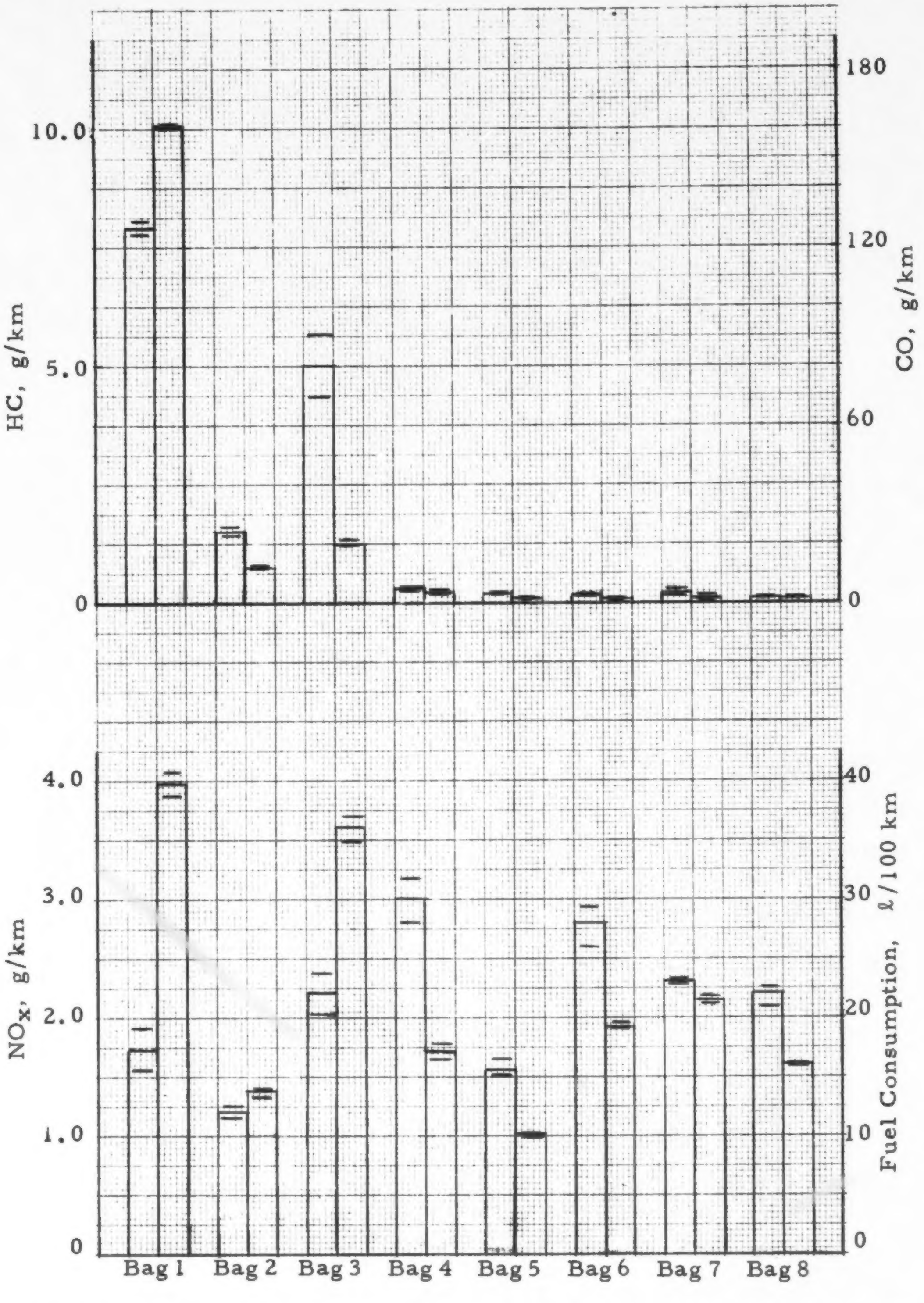

FIGURE C-12. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 8 HR SOAK
1976 Plymouth Fury

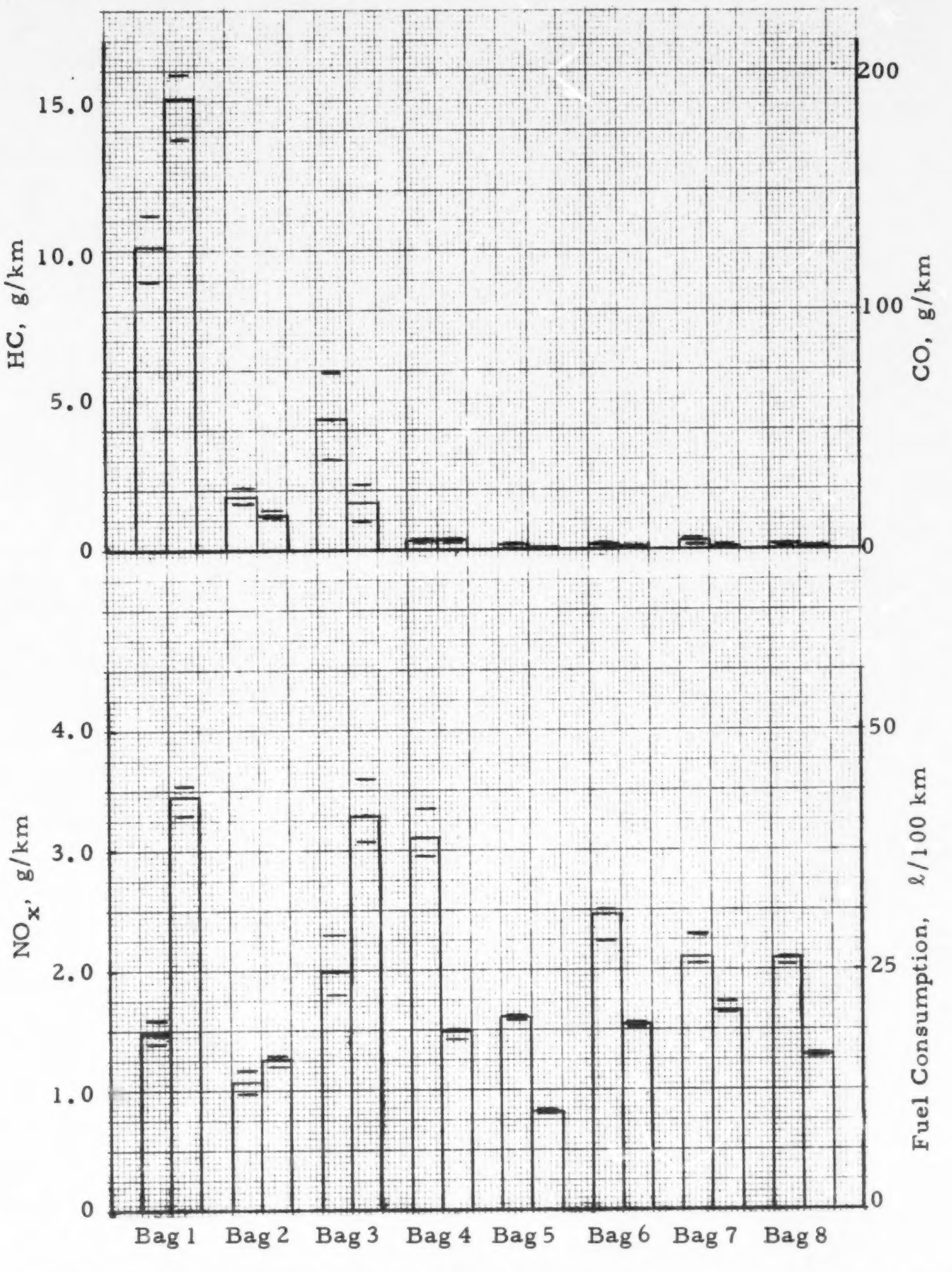

FIGURE C-13. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 16 HR SOAK
1976 Plymouth Fury

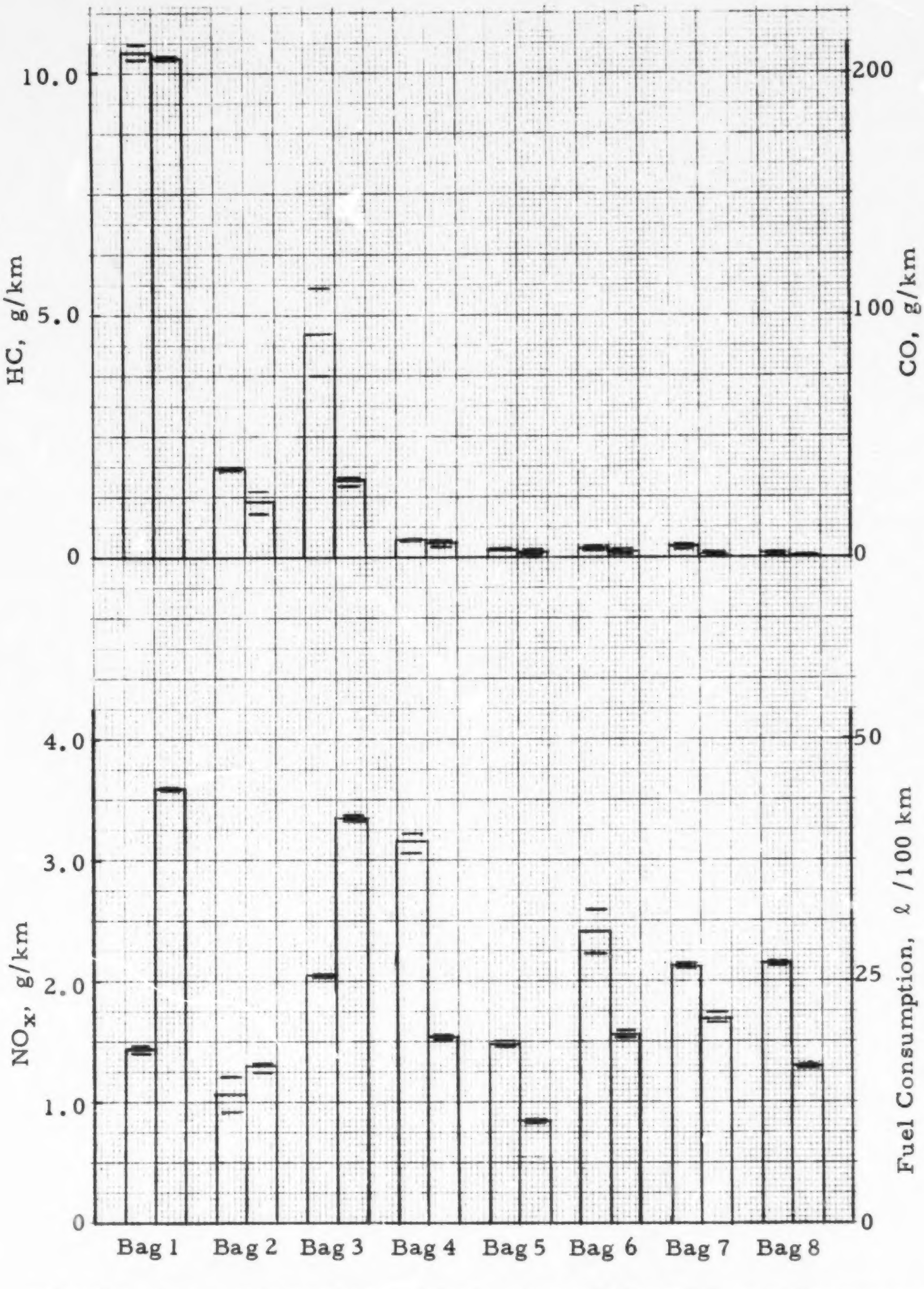

FIGURE C-14. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 36 HR SOAK
1976 Plymouth Fury

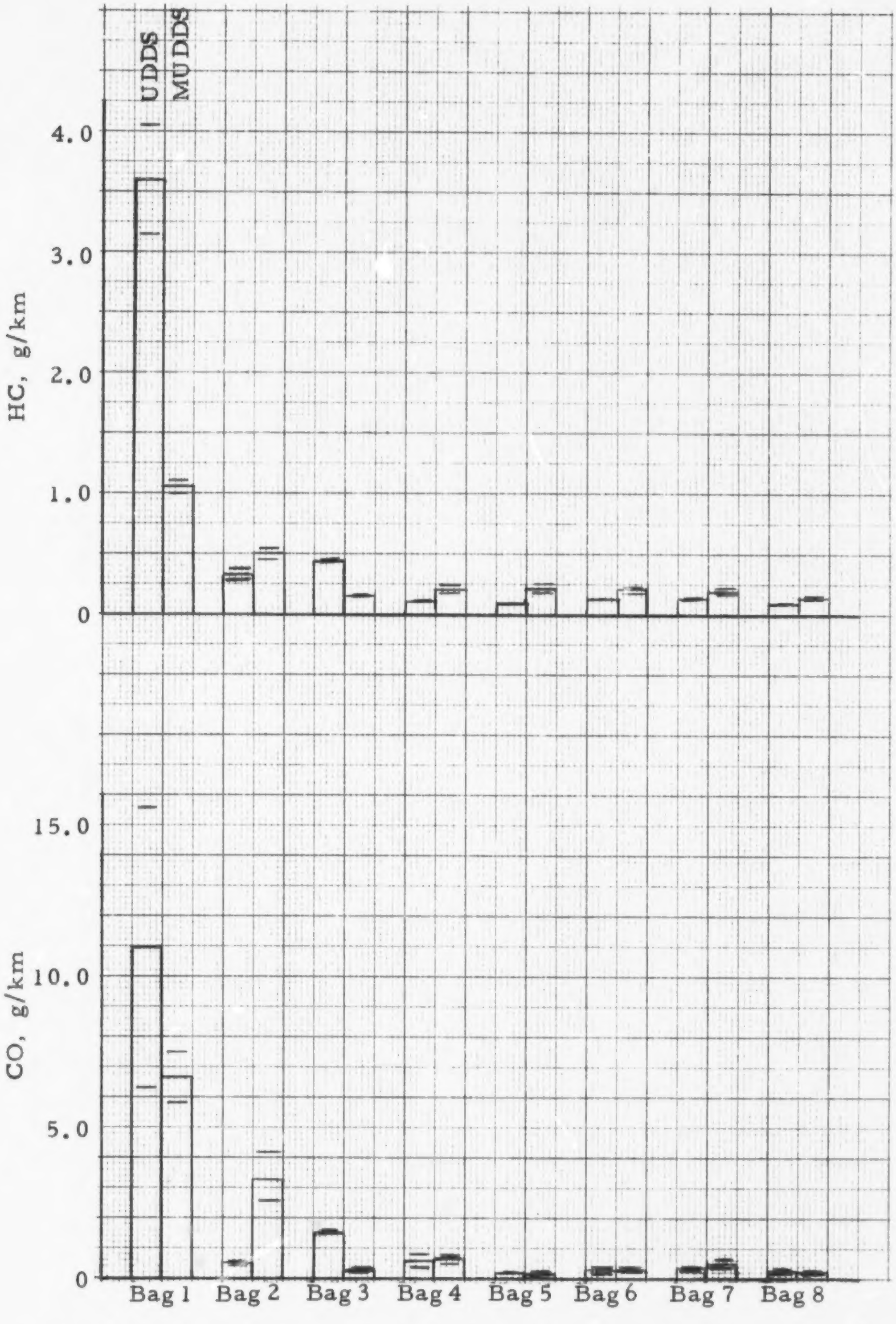

FIGURE C-15. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1976 Plymouth Fury

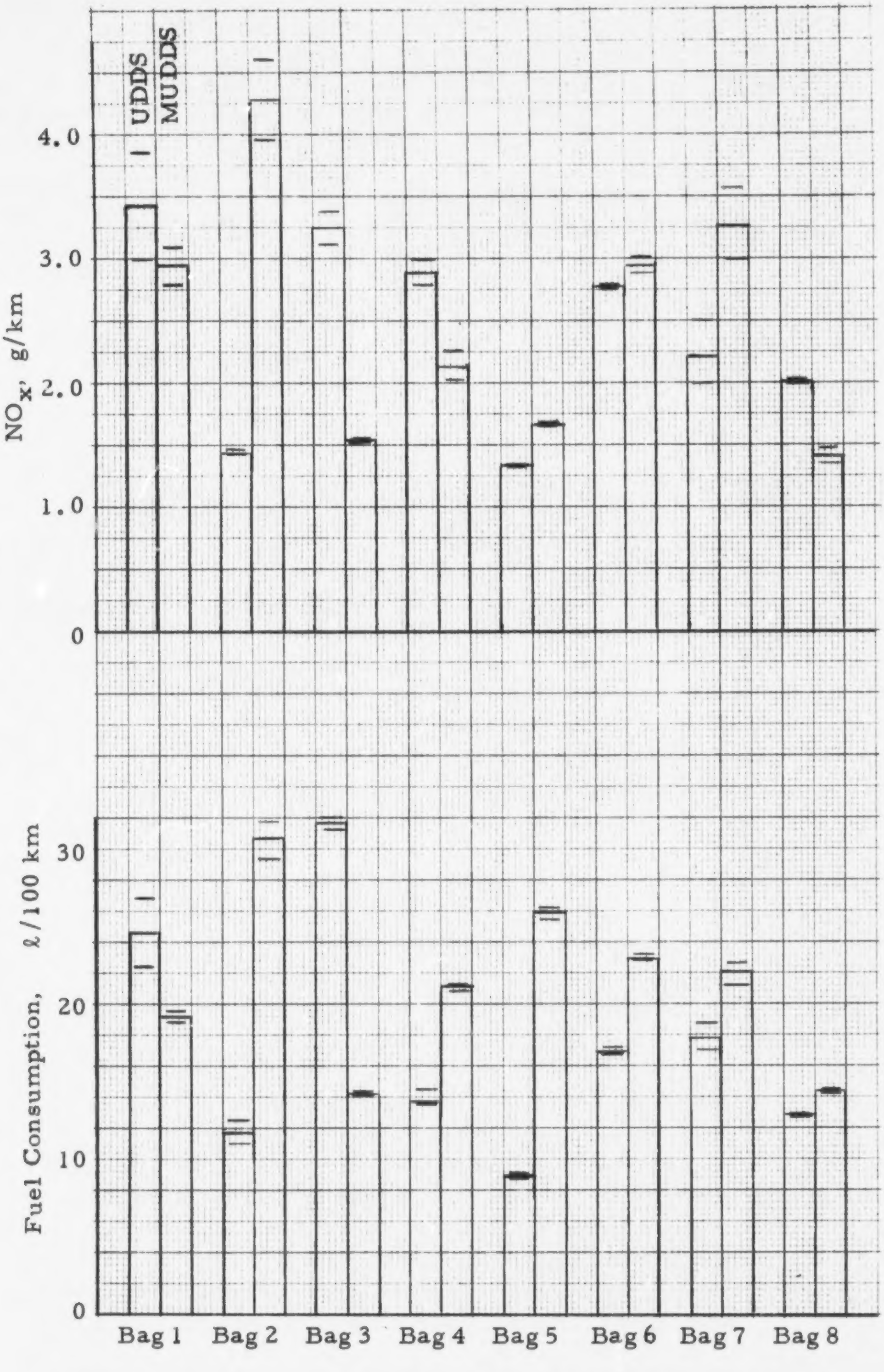

FIGURE C-16. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1976 Plymouth Fury

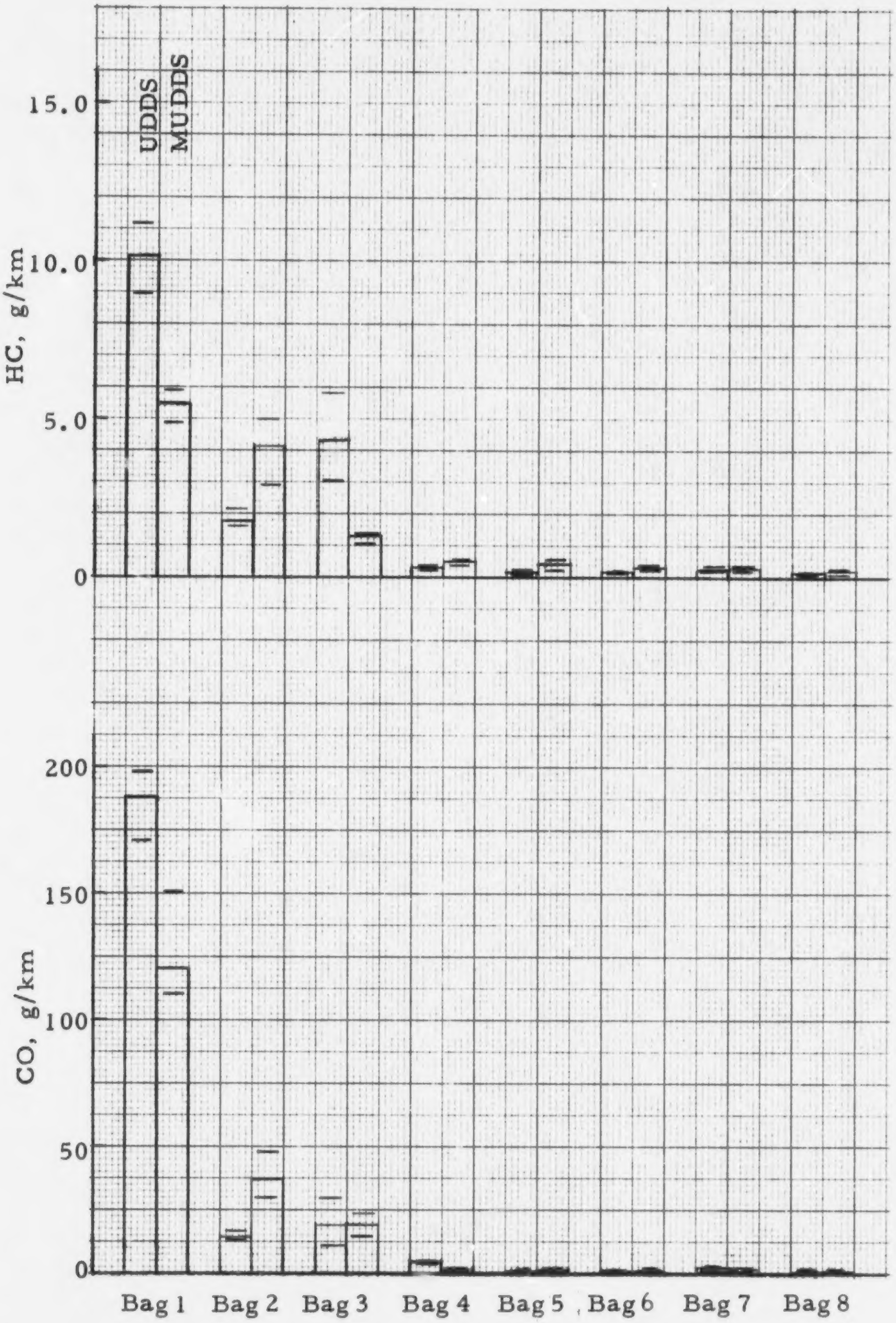

FIGURE C-17. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Plymouth Fury

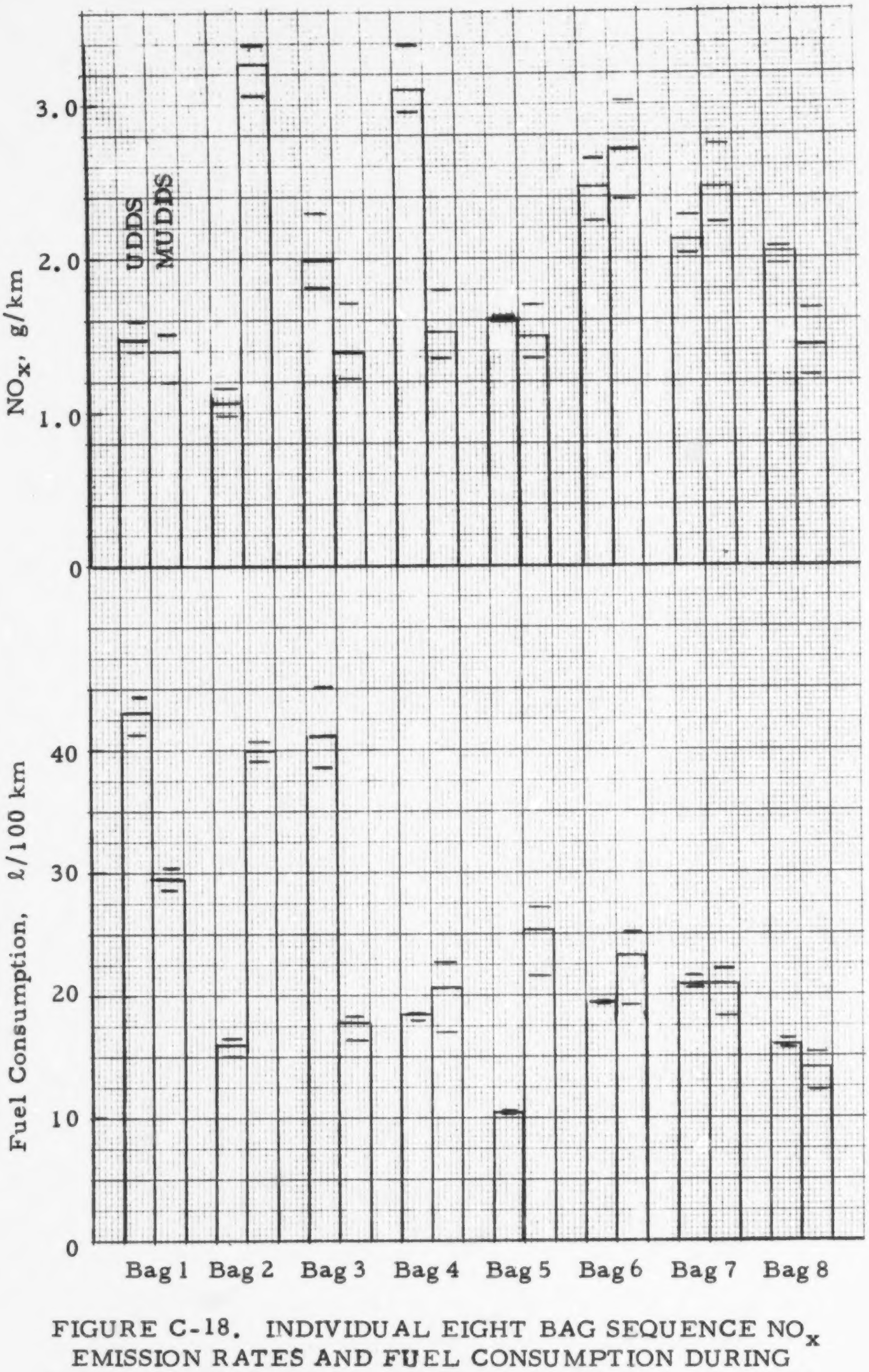

FIGURE C-18. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Plymouth Fury

APPENDIX D

SUMMARIZED TEST DATA
1976 CHEVROLET VEGA

TABLE D-1. TEST NUMBERS CORRESPONDING TO DYNAMOMETER TESTS AT EACH CONDITION
1976 Chevrolet Vega

Test Type	Replication 1	2	3
UDDS			
10 min soak	25	26	
20 min soak	23	24	
30 min soak	22	33	
1 hr soak	19	20	
2 hr soak	17	18	
4 hr soak	15	16	
8 hr soak	13	34	
16 hr soak	3	11	31
36 hr soak	9	10	
MUDDS			
10 min soak	12	29	
16 hr soak	4	5	6
HFET			
10 min soak	3	10	30
MHFET			
10 min soak	4	5	6

TABLE D-2. EMISSION AND FUEL ECONOMY RESULTS, URBAN DRIVING CYCLES
1976 Chevrolet Vega

Soak Length	Test No.	Date	HC, g/km			CO, g/km			NO$_x$, g/km			Fuel Consumption ℓ/100 km		
			505(1) sec	867(2) sec	Cycle(3)	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle
							UDDS							
10 min	25	2/3/77	0.26	0.05	0.15	0.61	0.55	0.57	0.95	0.46	0.70	10.44	10.48	10.45
	26	2/3/77	0.23	0.07	0.15	0.65	0.85	0.75	0.99	0.46	0.71	10.28	10.55	10.40
		Average	0.25	0.06	0.15	0.63	0.70	0.66	0.97	0.46	0.70	10.36	10.52	10.43
			(0.39)(4)	(0.10)	(0.24)	(1.01)	(1.13)	(1.06)	(1.56)	(0.74)	(1.13)	(22.71)(5)	(22.37)	(22.56)
20 min	23	2/3/77	0.29	0.04	0.16	1.41	0.65	1.02	0.92	0.42	0.66	10.25	9.66	9.93
	24	2/3/77	0.31	0.05	0.17	1.19	0.54	0.85 -	0.96	0.47	0.71	10.34	10.63	10.47
		Average	0.30	0.05	0.17	1.30	0.60	0.94	0.94	0.45	0.67	10.30	10.15	10.20
			(0.48)	(0.08)	(0.27)	(2.09)	(0.97)	(1.51)	(1.51)	(0.72)	(1.08)	(22.84)	(23.18)	(23.06)
30 min	22	2/2/77	0.34	0.06	0.19	1.33	0.58	0.95	0.98	0.45	0.70	9.98	10.47	10.22
	33	2/4/77	0.32	0.06	0.21	1.02	0.43	0.71	0.98	0.50	0.73	10.29	10.95	10.62
		Average	0.33	0.06	0.20	1.18	0.51	0.83	0.98	0.47	0.72	10.14	10.71	10.42
			(0.53)	(0.09)	(0.32)	(1.89)	(0.82)	(1.33)	(1.58)	(0.76)	(1.16)	(23.20)	(21.96)	(22.58)
1 hr	19	2/2/77	0.42	0.05	0.23	1.38	0.63	0.99	1.06	0.44	0.74	10.72	10.85	10.77
	20	2/2/77	0.44	0.05	0.24	1.40	0.61	0.99	1.04	0.45	0.73	10.48	10.29	10.36
		Average	0.43	0.05	0.24	1.39	0.62	0.99	1.05	0.45	0.74	10.60	10.57	10.57
			(0.69)	(0.08)	(0.39)	(2.24)	(1.99)	(1.59)	(1.69)	(0.72)	(1.19)	(22.19)	(22.26)	(22.26)
2 hr	17	1/31/77	0.39	0.05	0.21	2.34	0.89	1.58	1.00	0.47	0.73	11.18	10.53	10.82
	18	1/31/77	0.40	0.05	0.22	2.24	0.80	1.49	1.07	0.47	0.76	11.25	10.76	10.98
		Average	0.40	0.05	0.22	2.29	0.85	1.54	1.04	0.47	0.75	11.22	10.65	10.90
			(0.64)	(0.08)	(0.35)	(3.68)	(1.37)	(2.48)	(1.67)	(0.76)	(1.21)	(20.97)	(20.09)	(21.58)
4 hr	15	2/1/77	0.54	0.05	0.28	3.00	0.90	1.90	1.12	0.51	0.80	12.09	11.28	11.65
	16	2/1/77	0.51	0.05	0.27	3.65	1.07	2.30	1.08	0.44	0.75	11.79	10.56	11.13
		Average	0.53	0.05	0.28	3.33	0.99	2.10	1.10	0.48	0.78	11.94	10.92	11.39
			(0.85)	(0.08)	(0.44)	(5.36)	(1.59)	(3.38)	(1.77)	(0.77)	(1.26)	(19.70)	(21.54)	(18.33)
8 hr	13	1/28/77	0.64	0.05	0.33	9.46	0.88	4.99	1.17	0.53	0.84	11.95	10.79	11.32
	34	2/7/77	0.63	0.07	0.34	8.72	1.10	4.75	1.12	0.46	0.77	12.28	10.58	11.37
		Average	0.64	0.06	0.34	9.09	0.99	4.87	1.15	0.50	0.81	12.12	10.69	11.35
			(1.03)	(0.10)	(0.55)	(14.63)	(1.59)	(7.84)	(1.85)	(0.80)	(1.30)	(19.41)	(22.01)	(20.73)
16 hr	3	1/4/77	0.83	0.05	0.42	9.13	0.75	4.76	1.17	0.50	0.82	12.52	10.89	11.64
	11	1/27/77	0.72	0.07	0.38	8.15	0.67	4.26	1.14	0.47	0.79	13.05	11.40	12.17
	31	2/4/77	0.67	0.07	0.36	9.64	0.41	4.83	1.11	0.50	0.79	12.69	11.42	12.00
		Average	0.74	0.06	0.39	8.97	0.61	4.62	1.14	0.49	0.80	12.75	11.24	11.94
			(1.19)	(0.10)	(0.63)	(14.43)	(0.98)	(7.43)	(1.83)	(0.79)	(1.29)	(18.45)	(20.92)	(19.70)
36 hr	9	1/24/77	0.74	0.03	0.37	12.87	1.40	6.89	1.27	0.49	0.86	12.94	12.90	11.85
	10	1/26/77	0.84	0.06	0.43	11.86	1.03	6.21	1.12	0.48	0.79	12.55	10.90	11.66
		Average	0.79	0.05	0.40	12.37	1.22	6.55	1.20	0.49	0.83	12.75	11.90	11.76
			(1.27)	(0.08)	(0.64)	(19.90)	(1.96)	(10.54)	(1.93)	(0.79)	(1.34)	(18.45)	(19.77)	(20.00)
							MUDDS							
10 min	12	1/27/77	0.22	0.09	0.13	1.18	0.45	0.61	0.90	0.73	0.63	13.00	9.97	10.39
	29	2/2/77	0.29	0.07	0.13	0.79	0.62	0.67	0.81	0.69	0.73	12.21	9.76	10.49
		Average	0.26	0.08	0.13	0.99	0.54	0.64	0.86	0.71	0.68	12.61	9.87	10.44
			(0.41)	(0.13)	(0.21)	(1.58)	(0.86)	(1.03)	(1.38)	(1.14)	(1.09)	(18.66)	(23.85)	(22.53)
16 hr	4	1/8/77	1.28	0.05	0.43	14.90	0.51	4.90	0.86	0.67	0.72	15.41	10.09	11.69
	5	1/19/77	0.97	0.05	0.33	10.52	0.54	3.58	0.93	0.77	0.82	15.29	10.19	11.72
	6	1/21/77	1.23	0.04	0.40	13.08	0.65	4.44	0.88	0.62	0.69	15.20	9.43	11.17
		Average	1.16	0.05	0.39	12.83	0.57	4.31	0.89	0.69	0.74	15.30	9.90	11.53
			(1.87)	(0.08)	(0.63)	(20.60)	(0.92)	(6.93)	(1.43)	(1.11)	(1.19)	(15.38)	(23.76)	(20.40)

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(1) First 505 second bag results
(2) Last 867 second bag results
(3) 23 minute cycle composite
(4) g/mi
(5) mi/gal

TABLE D-3. EMISSION AND FUEL ECONOMY RESULTS OF HFET AND MODIFIED HFET
1976 Chevrolet Vega

Test Cycle	Test No.	Date Run	HC, g/km	CO, g/km	NO_x, g/km	Fuel Consumption, ℓ/100 km
HFET	3	1/17/77	0.04	0.15	0.84	8.00
	10	1/26/77	0.05	0.17	0.75	8.16
	30	2/2/77	0.05	0.20	0.82	8.06
	Average		0.05	0.17	0.80	8.07
			(0.08)(1)	(0.28)(1)	(1.29)(1)	(29.14)(2)
MHFET	4	1/18/77	0.03	0.22	0.82	7.71
	5	1/19/77	0.04	0.25	1.10	8.58
	6	1/21/77	0.04	0.26	0.93	8.13
	Average		0.04	0.24	0.95	8.14
			(0.06)	(0.39)	(1.53)	(28.90)

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(1) g/mi

(2) mi/gal

TABLE D-4. SOAK TEMPERATURE DATA, 1976 CHEVROLET VEGA

Soak Length	Test No.	Soak Date(s)	Temperature, °C Inlet Air Max	Inlet Air Min	Inlet Air Avg	Water Out Max	Water Out Min	Water Out Avg	Oil Sump Max	Oil Sump Min	Oil Sump Avg	Fuel Tank Vapor Max	Fuel Tank Vapor Min	Fuel Tank Vapor Avg	Fuel Tank Liquid Max	Fuel Tank Liquid Min	Fuel Tank Liquid Avg
10 min	25	2/3/77	58	33	47	91	84	86	87	80	82	38	38	38	36	36	36
	26	2/3/77	60	32	50	93	87	90	88	82	85	39	39	39	38	37	38
	Overall Average				49			88			84			39			37
20 min	23	2/3/77	62	31	54	92	81	88	86	76	81	34	33	34	31	30	31
	24	2/3/77	63	32	53	92	83	88	87	78	81	36	36	36	34	34	34
	Overall Average				54			88			81			35			33
30 min	22	2/2/77	62	34	56	92	80	84	87	74	78	36	35	35	34	32	33
	33	2/4/77	59	33	54	89	74	83	79	69	75	33	32	32	30	29	30
	Overall Average				55			84			77			34			32
1 hr	19	2/2/77	65	34	63	96	70	82	91	65	76	33	30	31	27	26	26
	20	2/2/77	68	34	64	98	69	85	95	66	81	37	33	35	31	29	30
	Overall Average				64			84			79			33			28
2 hr	17	1/31/77	63	31	53	92	45	66	89	48	63	33	28	29	27	25	25
	18	1/31/77	62	30	54	94	45	68	91	48	66	35	28	31	30	26	27
	Overall Average				54			67			65			30			26
4 hr	15	2/1/77	58	33	44	94	34	52	86	36	53	32	25	26	27	24	25
	16	2/1/77	66	34	48	95	35	54	92	38	55	36	27	29	30	25	27
	Overall Average				46			53			54			28			26
8 hr	13	1/28/77	65	28	39	96	28	42	93	29	43	36	27	28	29	25	26
	34	2/7/77	65	27	37	96	27	40	94	29	43	33	26	27	25	25	25
	Overall Average				38			41			43			28			26
16 hr	3	1/16-1/17/77	63	23	30	90	22	28	93	22	33	34	21	24	28	21	23
	11	1/26-1/27/77	71	25	33	28	25	33	95	25	35	36	24	26	29	23	25
	31	2/3-2/4/77	67	24	31	95	23	32	93	23	34	32	21	26	38	22	25
	Overall Average				31			31			34			25			24
36 hr	9	1/22-1/24/77	65	22	26	92	23	26	84	22	27	32	22	23	27	21	22
	10	1/24-1/26/77	66	24	26	94	24	26	103	24	26	36	22	24	27	21	23
	Overall Average				26			26			27			24			23

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE D-5. TEMPERATURES MEASURED DURING VARIOUS TRANSIENT CYCLES
1976 Chevrolet Vega

Soak Length	Test No.	Date	Temperature, °C														
			Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
								UDDS									
10 min	25	2/3/77	57	30	31	91	78	84	90	79	87	39	38	38	38	37	37
	26	2/3/77	59	30	31	92	79	85	90	80	87	40	39	39	39	37	38
	Overall Average				31			85			87			39			38
20 min	23	2/3/77	57	30	30	88	74	83	88	73	84	35	34	34	33	30	32
	24	2/3/77	62	31	31	89	76	84	89	76	86	37	36	36	36	34	35
	Overall Average				31			84			85			35			34
30 min	22	2/2/77	62	31	33	88	74	83	88	73	84	36	35	35	35	33	34
	33	2/4/77	56	31	32	87	70	82	82	66	79	35	31	33	33	29	31
	Overall Average				33			83			82			34			33
1 hr	19	2/2/77	53	31	33	90	67	84	95	64	87	36	30	32	31	26	28
	20	2/2/77	51	30	32	86	66	82	87	68	82	34	32	31	32	29	31
	Overall Average				33			83			85			32			30
2 hr	17	1/31/77	41	27	29	87	45	79	91	48	80	34	27	28	29	25	26
	18	1/31/77	40	27	31	88	44	79	92	48	80	35	28	29	30	26	27
	Overall Average				30			79			80			29			27
4 hr	15	2/1/77	43	26	31	89	33	78	92	36	76	34	26	28	29	24	26
	16	2/1/77	34	27	31	89	35	78	92	38	76	33	26	28	28	25	26
	Overall Average				31			78			76			28			26
8 hr	13	1/28/77	42	28	30	87	28	75	89	29	73	34	26	29	30	25	27
	34	2/7/77	39	27	32	89	28	78	93	29	76	34	26	30	30	25	27
	Overall Average				31			77			75			30			27
16 hr	3	1/17/77	61	23	32	87	22	76	87	22	71	30	21	25	26	21	23
	11	1/28/77	42	25	31	86	25	74	84	25	68	31	24	26	27	23	25
	31	2/4/77	46	26	30	84	23	75	75	23	65	27	22	24	26	21	23
	Overall Average				31			75			68			25			24
36 hr	19	1/24/77	57	22	32	87	23	76	90	22	70	31	22	26	26	21	23
	20	1/26/77	62	23	32	88	23	75	101	23	81	32	23	26	28	23	24
	Overall Average				32			76			76			26			24
								MUDDS									
10 min	12	1/27/77	53	31	32	88	73	82	94	73	83	34	31	32	32	28	30
	29	2/2/77	57	32	33	92	78	84	95	81	85	38	36	37	36	35	35
	Overall Average				33			83			84			35			33
16 hr	4	1/18/77	63	22	31	86	22	74	90	22	68	29	22	24	24	21	22
	5	1/19/77	68	22	32	87	22	74	89	22	65	28	21	24	26	20	23
	6	1/21/77	54	23	31	87	23	74	89	23	66	28	22	25	25	21	23
	Overall Average				31			74			66			25			23
								HFET									
10 min	3	1/17/77	57	31	34	92	78	87	105	82	96	37	33	34	32	27	30
	10	1/26/77	57	29	31	90	79	87	106	86	100	38	33	34	33	28	29
	30	2/2/77	61	27	33	97	79	87	106	87	97	40	39	39	39	36	37
	Overall Average				33			87			98			36			32
								MHFET									
10 min	4	1/18/77	62	28	30	98	82	87	106	91	101	42	39	40	36	32	34
	5	1/19/77	61	29	31	98	80	88	106	90	100	43	39	41	37	34	36
	6	1/21/77	63	30	32	96	79	88	104	83	97	34	31	33	29	25	27
	Overall Average				31			88			99			38			32

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE D-6. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 10 MINUTE SOAK
1976 Chevrolet Vega

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TEST NO. 25

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.00	.94	2.86	1.94	1.82	5.54	133.5	125.1	381.4	.34	.32	.97	16.85
2	.13	.12	.18	.16	.15	.22	137.6	131.6	191.0	.20	.19	.28	8.15
3	.06	.06	.25	.26	.25	1.08	96.9	92.0	403.6	.33	.31	1.37	17.24
4	.11	.10	.08	.26	.25	.19	346.8	329.8	253.1	2.51	2.39	1.83	10.85
5	.06	.06	.04	.02	.02	.01	207.6	198.4	148.3	.76	.73	.54	6.34
6	.04	.04	.07	.34	.32	.62	148.9	141.1	270.7	.49	.46	.89	11.67
7	.02	.02	.05	.15	.14	.36	110.7	105.2	263.5	.38	.36	.90	11.32
8	.04	.04	.06	.13	.12	.10	175.3	164.4	243.5	.49	.46	.68	10.36
EIGHT BAG TOTAL	1.46			3.26			1357.2			5.50			
505 SEC BAG MASS	1.49			3.50			1402.0			5.52			
PERCENT DIFFERENCE	2.01			6.86			3.19			.36			

TEST NO. 26

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.84	.80	2.40	1.66	1.58	4.74	121.8	115.7	348.1	.29	.28	.83	15.33
2	.13	.12	.18	.10	.09	.14	130.7	123.5	181.6	.21	.20	.29	7.74
3	.05	.05	.21	.71	.68	2.96	91.9	88.0	383.0	.32	.31	1.33	16.49
4	.10	.09	.07	.62	.59	.45	332.5	315.2	242.7	2.45	2.32	1.79	10.42
5	.06	.06	.04	.11	.11	.08	206.0	196.8	147.1	.76	.73	.54	6.29
6	.02	.02	.04	.18	.17	.33	143.4	136.6	260.8	.51	.49	.93	11.22
7	.02	.02	.05	.12	.11	.29	110.7	105.6	263.5	.44	.42	1.05	11.32
8	.03	.03	.04	.07	.06	.10	174.6	161.4	242.4	.66	.61	.92	10.30
EIGHT BAG TOTAL	1.25			3.57			1311.7			5.64			
505 SEC BAG MASS	1.33			3.75			1380.7			5.72			
PERCENT DIFFERENCE	6.02			4.80			5.00			1.40			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-7. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 20 MINUTE SOAK

1976 Chevrolet Vega

TEST NO. 23

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.96	.91	2.74	4.75	4.49	13.57	125.7	118.7	359.1	.20	.19	.57	16.42
2	.38	.37	.53	.82	.80	1.14	137.7	133.9	191.3	.15	.15	.21	8.27
3	.14	.13	.58	.66	.62	2.75	101.1	94.6	421.2	.22	.21	.92	18.14
4	.18	.17	.13	1.18	1.13	.86	347.2	333.3	253.4	2.49	2.39	1.82	10.91
5	.07	.07	.05	.11	.11	.08	223.6	215.3	159.7	.84	.81	.60	6.83
6	.04	.04	.07	.51	.49	.93	150.4	143.7	273.5	.47	.45	.85	11.81
7	.03	.03	.07	.23	.22	.55	116.7	111.2	278.0	.39	.37	.93	11.96
8	.04	.04	.06	.07	.07	.10	181.8	169.1	252.5	.61	.57	.85	10.73
EIGHT BAG TOTAL	1.84			8.33			1384.2			5.37			
505 SEC BAG MASS	1.69			8.16			1368.1			5.29			
PERCENT DIFFERENCE	-8.88			-2.08			-1.17			-1.51			

TEST NO. 24

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.16	1.09	3.31	3.51	3.31	10.03	125.8	118.5	359.3	.21	.20	.60	16.28
2	.24	.23	.33	.60	.58	.83	132.3	128.5	183.8	.17	.17	.24	7.90
3	.14	.13	.58	1.05	.99	4.37	102.6	97.1	427.5	.28	.26	1.17	18.52
4	.15	.14	.11	.57	.54	.42	354.5	336.5	258.8	2.55	2.42	1.86	11.11
5	.07	.07	.05	.04	.04	.03	222.6	213.4	158.6	.87	.84	.62	6.78
6	.04	.04	.07	.52	.49	.95	150.2	140.1	273.0	.51	.48	.93	11.79
7	.02	.02	.05	.07	.07	.17	114.4	110.0	272.3	.46	.44	1.10	11.69
8	.04	.04	.06	.10	.09	.14	180.8	168.4	251.1	.66	.61	.92	10.67
EIGHT BAG TOTAL	1.86			6.46			1382.5			5.71			
505 SEC BAG MASS	1.79			6.85			1381.5			5.56			
PERCENT DIFFERENCE	-3.91			5.69			-.07			-2.70			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-8. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 30 MINUTE SOAK

1976 Chevrolet Vega

TEST NO. 22

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.27	1.21	3.63	3.31	3.16	9.46	132.7	126.8	379.2	.32	.31	.91	17.12
2	.38	.37	.53	.62	.60	.96	134.3	129.1	186.5	.24	.23	.33	8.04
3	.16	.15	.67	.68	.64	2.83	102.9	97.5	428.6	.39	.37	1.63	18.47
4	.17	.16	.12	.70	.67	.51	344.2	329.9	251.3	2.48	2.38	1.81	10.80
5	.04	.08	.06	.13	.12	.09	212.8	195.5	152.0	.77	.71	.55	6.51
6	.04	.04	.07	.13	.13	.24	140.3	137.1	255.2	.46	.45	.84	10.98
7	.03	.03	.07	.24	.22	.57	113.7	106.6	270.7	.49	.46	1.17	11.65
8	.05	.05	.07	.10	.09	.14	171.7	162.0	238.5	.77	.73	1.07	10.15
EIGHT BAG TOTAL	2.14			5.91			1352.7			5.92			
505 SEC BAG MASS	1.96			7.82			1330.7			5.69			
PERCENT DIFFERENCE	-11.73			24.42			-1.65			-4.04			

TEST NO. 33

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.04	.98	2.97	2.78	2.61	7.94	123.2	115.8	351.9	.25	.24	.71	15.78
2	.52	.50	.72	.68	.66	.94	124.9	120.4	173.4	.19	.18	.26	7.52
3	.17	.16	.71	.58	.55	2.42	94.9	90.2	395.4	.30	.29	1.25	17.04
4	.20	.19	.15	1.12	1.06	.82	312.3	295.6	228.0	2.08	1.97	1.52	9.82
5	.09	.09	.06	.06	.06	.04	206.6	197.1	147.6	.79	.75	.56	6.31
6	.04	.04	.07	.05	.05	.09	143.0	136.2	260.0	.49	.47	.89	11.17
7	.03	.03	.07	.13	.12	.31	111.6	106.3	265.7	.42	.40	1.00	11.42
8	.05	.05	.07	.19	.18	.26	172.5	160.5	239.6	.71	.66	.99	10.20
EIGHT BAG TOTAL	2.14			5.59			1288.9			5.23			
505 SEC BAG MASS	2.11			5.91			1376.1			5.66			
PERCENT DIFFERENCE	-1.42			5.41			6.33			7.60			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-9. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 1 HR SOAK

1976 Chevrolet Vega

TEST NO. 19

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.35	1.28	3.86	4.10	3.90	11.71	141.8	134.8	405.1	.29	.28	.83	18.40
2	.64	.61	.89	.97	.93	1.35	141.8	135.7	196.9	.22	.21	.31	8.57
3	.18	.17	.75	.75	.72	3.12	105.3	100.6	438.7	.27	.26	1.12	18.94
4	.22	.21	.16	1.00	.95	.73	351.9	334.6	256.9	2.57	2.44	1.88	11.06
5	.07	.07	.05	.01	.01	.01	215.4	205.2	153.9	.85	.81	.61	6.58
6	.03	.03	.05	.42	.40	.76	144.7	136.3	263.0	.56	.53	1.02	11.35
7	.02	.02	.05	.17	.16	.40	111.6	106.3	265.8	.51	.49	1.21	11.42
8	.03	.03	.04	.23	.21	.32	168.9	157.8	234.5	.74	.69	1.03	9.98
EIGHT BAG TOTAL	2.54			7.65			1381.4			6.01			
505 SEC BAG MASS	2.40			7.97			1429.4			6.15			
PERCENT DIFFERENCE	-5.83			4.02			3.36			2.28			

TEST NO. 20

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.29	1.24	3.64	3.61	3.48	10.31	126.4	121.9	361.1	.26	.25	.74	16.42
2	.66	.63	.92	1.00	.95	1.39	137.7	130.7	191.3	.24	.23	.33	8.34
3	.23	.22	.96	.98	.93	4.08	96.8	92.3	403.4	.36	.34	1.50	17.52
4	.27	.26	.20	1.52	1.46	1.11	352.2	338.1	257.1	2.69	2.58	1.96	11.10
5	.09	.08	.06	.05	.05	.04	211.5	198.6	151.0	.81	.76	.58	6.46
6	.04	.04	.07	.19	.18	.35	138.7	132.7	252.1	.48	.46	.57	10.85
7	.03	.03	.07	.09	.08	.19	108.8	102.4	259.0	.48	.45	1.14	11.12
8	.05	.05	.07	.17	.16	.24	169.9	160.8	236.0	.77	.73	1.07	10.04
EIGHT BAG TOTAL	2.66			7.60			1341.9			6.09			
505 SEC BAG MASS	2.57			8.09			1395.9			6.02			
PERCENT DIFFERENCE	-3.50			6.06			3.87			-1.16			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-10. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 2 HR SOAK
1976 Chevrolet Vega

TEST NO. 17

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.08	1.03	3.09	6.44	6.21	18.54	153.0	146.4	437.0	.34	.33	.97	20.09
2	.62	.59	.86	2.79	2.65	3.88	156.8	149.1	217.7	.28	.27	.39	9.62
3	.25	.24	1.04	1.55	1.52	6.46	97.1	95.0	404.4	.33	.32	1.37	17.74
4	.25	.23	.18	1.36	1.27	.99	353.0	329.3	257.6	2.23	2.08	1.63	11.11
5	.09	.09	.06	.19	.18	.14	222.3	213.1	158.8	.76	.73	.54	6.80
6	.04	.04	.07	.38	.36	.69	153.1	143.3	278.3	.50	.47	.91	12.00
7	.03	.03	.07	.43	.41	1.02	115.6	111.2	275.3	.42	.40	1.00	11.88
8	.04	.04	.06	.30	.28	.42	187.5	174.7	260.4	.65	.61	.90	11.09
EIGHT BAG TOTAL	2.40			13.44			1438.2			5.51			
505 SEC BAG MASS	2.24			13.44			1484.4			5.79			
PERCENT DIFFERENCE	-7.14			.00			3.11			4.84			

TEST NO. 18

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.10	1.06	3.14	5.57	5.36	15.91	148.2	142.5	423.3	.40	.38	1.14	19.34
2	.63	.60	.88	1.63	1.55	2.26	149.3	142.2	207.3	.23	.22	.32	9.07
3	.21	.20	.97	1.73	1.68	7.21	100.9	97.8	420.5	.33	.32	1.37	18.45
4	.30	.28	.22	3.09	2.92	2.26	343.1	323.7	250.5	2.21	2.08	1.61	10.89
5	.09	.08	.06	.46	.43	.33	247.5	232.4	176.8	.84	.79	.60	7.58
6	.03	.03	.05	.34	.32	.62	156.6	149.6	284.7	.53	.51	.96	12.27
7	.03	.03	.07	.30	.29	.71	138.7	132.1	330.4	.53	.50	1.26	14.22
8	.04	.04	.06	.29	.27	.40	210.2	192.6	292.0	.76	.70	1.06	12.43
EIGHT BAG TOTAL	2.43			13.41			1494.6			5.83			
505 SEC BAG MASS	2.30			12.95			1494.3			6.20			
PERCENT DIFFERENCE	-5.65			-3.55			-.02			5.97			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-11. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 4 HR SOAK

1976 Chevrolet Vega

TEST NO. 15

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.83	1.75	5.23	8.29	7.93	23.69	179.6	171.8	513.0	.48	.46	1.37	23.93
2	.73	.69	1.01	3.18	2.99	4.42	181.1	170.3	251.5	.26	.24	.36	11.11
3	.35	.34	1.46	2.79	2.71	11.62	132.2	128.6	550.9	.49	.48	2.04	24.36
4	.32	.31	.23	2.87	2.74	2.09	387.1	369.2	282.5	2.52	2.40	1.84	12.25
5	.09	.08	.06	.20	.19	.14	238.4	225.0	170.3	.92	.87	.66	7.29
6	.04	.04	.07	.52	.49	.95	160.9	152.5	292.5	.55	.52	1.00	12.63
7	.02	.02	.05	.24	.23	.57	120.0	114.3	285.7	.43	.41	1.02	12.29
8	.04	.04	.06	.18	.17	.25	194.4	181.4	270.0	.82	.77	1.14	11.48
EIGHT BAG TOTAL	3.42			18.27			1593.6			6.47			
505 SEC BAG MASS	3.13			17.32			1597.5			6.47			
PERCENT DIFFERENCE	-9.27			-5.48			.25			.00			

TEST NO. 16

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.71	1.63	4.89	9.56	9.09	27.31	170.4	162.0	486.9	.51	.48	1.46	23.02
2	.68	.65	.94	4.23	4.05	5.87	170.9	163.8	237.4	.28	.27	.39	10.60
3	.27	.26	1.12	2.47	2.37	10.29	126.7	121.8	527.9	.45	.43	1.87	23.24
4	.32	.30	.23	3.75	3.57	2.74	372.9	355.1	272.2	2.36	2.25	1.72	11.85
5	.10	.09	.07	.43	.41	.31	238.4	225.6	170.3	.91	.86	.65	7.30
6	.03	.03	.05	.24	.23	.44	158.2	149.8	287.7	.52	.49	.95	12.39
7	.02	.02	.05	.15	.14	.36	119.2	113.5	283.7	.47	.45	1.12	12.19
8	.03	.03	.04	.06	.06	.08	188.6	175.4	261.9	.73	.68	1.01	11.13
EIGHT BAG TOTAL	3.16			20.89			1545.3			6.23			
505 SEC BAG MASS	2.93			21.10			1552.1			6.23			
PERCENT DIFFERENCE	-7.85			1.00			.44			.00			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-12. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 8 HR SOAK

1976 Chevrolet Vega

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TEST NO. 13

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.99	1.90	5.69	28.64	27.28	81.83	158.7	151.1	453.3	.38	.36	1.09	25.32
2	.81	.77	1.13	12.50	11.92	17.36	167.4	159.7	232.5	.31	.30	.43	11.18
3	.42	.41	1.75	4.76	4.68	19.83	129.8	127.7	541.0	.55	.54	2.29	24.52
4	.41	.39	.30	7.40	7.03	5.40	367.2	348.6	268.0	2.78	2.64	2.03	11.87
5	.12	.11	.09	1.51	1.43	1.08	228.7	217.1	163.4	.94	.89	.67	7.06
6	.04	.04	.07	.60	.57	1.09	159.1	151.0	289.3	.59	.56	1.07	12.50
7	.03	.03	.07	.66	.63	1.57	111.4	105.9	265.2	.48	.46	1.14	11.48
8	.03	.03	.04	.17	.16	.24	189.5	176.3	263.2	.79	.73	1.10	11.20
EIGHT BAG TOTAL	3.85			56.24			1511.8			6.82			
505 SEC BAG MASS	3.70			54.63			1518.3			6.78			
PERCENT DIFFERENCE	-4.05			-2.95			.43			-.59			

TEST NO. 34

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.97	1.90	5.63	26.95	25.96	77.00	161.9	156.0	462.7	.35	.34	1.00	25.39
2	.86	.82	1.19	12.90	12.32	17.92	169.7	162.1	235.7	.27	.26	.38	11.36
3	.37	.35	1.54	3.78	3.61	15.75	138.6	132.4	577.4	.35	.33	1.46	25.77
4	.41	.39	.30	5.66	5.39	4.13	377.5	356.1	275.5	2.44	2.30	1.78	12.10
5	.14	.13	.10	1.39	1.32	.99	240.4	229.1	172.1	.90	.86	.64	7.43
6	.04	.04	.07	.21	.20	.38	161.0	151.4	292.8	.56	.53	1.02	12.60
7	.05	.05	.12	.80	.77	1.90	119.3	114.9	284.0	.50	.48	1.19	12.32
8	.05	.05	.07	.41	.38	.57	188.2	174.8	261.4	.78	.72	1.09	11.14
EIGHT BAG TOTAL	3.89			52.10			1557.1			6.15			
505 SEC BAG MASS	3.64			50.38			1570.4			6.46			
PERCENT DIFFERENCE	-6.87			-3.41			.85			4.80			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-13. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 16 HR SOAK

1976 Chevrolet Vega

TEST NO. 3

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.19	3.00	9.11	22.05	20.74	63.00	178.7	168.1	510.7	.62	.58	1.77	26.96
2	1.13	1.07	1.57	17.46	16.55	24.25	163.6	155.1	227.2	.18	.17	.25	11.48
3	.36	.35	1.50	4.72	4.56	19.67	122.4	118.3	510.1	.40	.39	1.67	23.17
4	.50	.48	.36	10.39	9.88	7.58	386.3	367.4	282.0	2.44	2.32	1.78	12.62
5	.13	.12	.09	1.43	1.36	1.02	251.0	239.0	179.3	1.07	1.02	.76	7.74
6	.01	.01	.02	.15	.14	.27	167.0	157.3	303.6	.54	.51	.98	13.05
7	.01	.01	.02	.07	.07	.17	124.2	119.3	295.8	.42	.40	1.00	12.69
8	.01	.01	.01	.14	.13	.19	193.8	182.2	269.1	.75	.71	1.04	11.44
EIGHT BAG TOTAL	5.34			56.41			1587.1			6.42			
505 SEC BAG MASS	4.81			52.75			1594.8			6.74			
PERCENT DIFFERENCE	-11.02			-6.94			.48			4.75			

TEST NO. 11

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.11	2.04	6.03	14.91	14.43	42.60	170.4	164.9	486.7	.57	.55	1.63	24.18
2	1.00	.93	1.39	17.65	16.50	24.51	194.1	181.4	269.6	.38	.36	.53	13.27
3	.50	.49	2.08	5.35	5.19	22.29	134.8	130.9	561.8	.46	.45	1.92	25.62
4	.52	.50	.38	6.82	6.51	4.98	396.9	378.6	289.7	2.55	2.43	1.86	12.78
5	.16	.15	.11	1.74	1.63	1.24	250.7	235.4	179.1	.88	.83	.63	7.75
6	.06	.06	.11	.66	.64	1.20	168.7	162.7	306.7	.63	.61	1.15	13.26
7	.05	.05	.12	.86	.81	2.05	126.0	118.5	300.0	.46	.43	1.10	13.01
8	.04	.04	.06	.38	.36	.53	198.8	187.3	276.1	.77	.73	1.07	11.77
EIGHT BAG TOTAL	4.44			48.37			1640.4			6.70			
505 SEC BAG MASS	4.16			47.10			1677.9			6.60			
PERCENT DIFFERENCE	-6.73			-2.70			2.23			-1.52			

TEST NO. 31

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.93	1.84	5.51	27.68	26.40	79.09	173.2	165.2	494.8	.32	.31	.91	26.87
2	1.01	.96	1.40	17.20	16.28	23.89	158.3	149.8	219.8	.30	.28	.42	11.12
3	.55	.53	2.29	4.92	4.72	20.50	139.2	133.6	580.0	.47	.45	1.96	26.30
4	.43	.41	.31	5.69	5.42	4.15	385.0	366.6	281.0	2.58	2.46	1.88	12.34
5	.11	.10	.08	1.03	.97	.74	242.4	228.7	173.2	.86	.81	.61	7.45
6	.04	.04	.07	.27	.26	.49	153.2	146.8	278.6	.52	.50	.95	12.00
7	.05	.05	.12	.54	.51	1.29	116.5	109.2	277.4	.42	.39	1.00	11.99
8	.04	.04	.06	.54	.51	.75	182.1	171.5	252.9	.63	.59	.88	10.79
EIGHT BAG TOTAL	4.16			57.87			1549.8			6.10			
505 SEC BAG MASS	3.89			55.70			1615.9			6.43			
PERCENT DIFFERENCE	-6.94			-3.90			4.09			5.13			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-14. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 36 HR SOAK

1976 Chevrolet Vega

TEST NO. 9

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.43	2.32	6.94	40.10	38.31	114.57	163.6	156.3	467.5	.41	.39	1.17	28.26
2	1.09	1.02	1.51	22.44	21.04	31.17	168.9	158.3	234.5	.28	.26	.39	12.24
3	.54	.52	2.25	6.28	6.06	24.17	139.8	134.9	582.6	.51	.49	2.13	26.78
4	.43	.41	.31	10.12	9.64	7.39	379.9	361.7	277.2	2.67	2.54	1.95	12.39
5	.10	.10	.07	.79	.75	.56	232.3	220.9	165.9	1.07	1.02	.76	7.13
6	.03	.03	.05	.32	.31	.58	154.6	148.9	281.1	.60	.58	1.09	12.11
7	.06	.06	.14	.86	.81	2.05	121.6	114.9	289.6	.58	.55	1.38	12.57
8	.03	.03	.04	.39	.36	.54	196.0	182.4	272.3	.97	.90	1.35	11.60
EIGHT BAG TOTAL	4.71			81.30			1556.7			7.09			
505 SEC BAG MASS	4.25			74.34			1619.5			7.34			
PERCENT DIFFERENCE	-10.82			-9.36			3.88			3.41			

TEST NO. 10

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.75	2.61	7.86	37.54	35.58	107.26	164.3	155.8	469.5	.41	.39	1.17	27.99
2	1.23	1.16	1.71	24.04	22.71	33.39	148.9	140.6	206.7	.18	.17	.25	11.23
3	.50	.49	2.08	5.63	5.50	23.46	116.3	113.6	484.4	.40	.39	1.67	22.41
4	.40	.38	.29	6.08	5.74	4.44	394.9	373.2	288.3	2.77	2.62	2.02	12.67
5	.13	.12	.04	1.18	1.12	.84	238.8	227.5	170.6	.89	.85	.64	7.35
6	.02	.02	.04	.01	.01	.02	166.4	157.7	302.5	.58	.55	1.05	12.49
7	.04	.04	.10	.74	.70	1.76	123.3	117.3	293.6	.48	.46	1.19	12.72
8	.04	.04	.06	.26	.24	.36	190.5	177.8	264.6	.70	.65	.97	11.26
EIGHT BAG TOTAL	5.11			75.48			1543.4			6.41			
505 SEC BAG MASS	4.85			68.49			1574.8			6.49			
PERCENT DIFFERENCE	-5.36			-10.21			1.99			1.23			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-15. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 10 MINUTE SOAK
1976 Chevrolet Vega

TEST NO. 12

	HC			CO			CO2			NOX			FUEL
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	CONS. L/ 100KM
1	.37	.35	.62	2.79	2.67	4.65	175.1	167.6	291.9	.50	.48	.83	12.96
2	.13	.13	.35	.59	.57	1.59	174.5	169.1	471.6	1.04	1.01	2.81	20.28
3	.10	.09	.15	.15	.14	.23	160.5	150.0	243.1	.38	.36	.58	10.42
4	.05	.05	.13	.13	.12	.33	108.7	104.6	278.8	.18	.17	.46	12.06
5	.05	.05	.17	.08	.07	.28	97.2	91.1	335.2	.15	.14	.52	14.37
6	.06	.06	.15	.06	.06	.15	140.7	134.6	360.7	.27	.26	.69	15.58
7	.06	.06	.14	.27	.26	.63	136.6	130.3	317.7	.39	.37	.91	13.49
8	.06	.06	.11	.11	.10	.20	120.7	111.9	215.5	.27	.25	.49	9.17
EIGHT BAG TOTAL	.88			4.18			1114.0			3.18			
505 SEC BAG MASS	.82			4.33			1112.1			3.31			
PERCENT DIFFERENCE	-7.32			3.46			-.17			3.93			

TEST NO. 29

	HC			CO			CO2			NOX			FUEL
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	CONS. L/ 100KM
1	.82	.78	1.37	2.50	2.39	4.17	171.2	163.8	285.3	.49	.47	.62	12.74
2	.06	.06	.16	.06	.06	.16	161.7	154.5	437.1	1.07	1.02	2.89	18.69
3	.08	.08	.12	.03	.03	.05	129.3	121.6	195.9	.22	.21	.33	8.39
4	.03	.03	.08	.02	.02	.05	103.5	98.9	265.3	.19	.18	.49	11.45
5	.02	.02	.07	.05	.05	.17	92.9	87.9	320.2	.13	.12	.45	13.71
6	.03	.03	.08	.10	.10	.26	125.0	118.8	320.4	.23	.22	.59	13.84
7	.03	.03	.07	.03	.03	.07	135.7	128.0	315.6	.27	.25	.63	13.35
8	.03	.03	.05	.06	.06	.11	113.1	106.0	201.9	.23	.22	.41	8.59
EIGHT BAG TOTAL	1.10			2.85			1032.3			2.83			
505 SEC BAG MASS	1.06			2.90			1045.2			2.97			
PERCENT DIFFERENCE	-3.77			1.72			1.23			4.71			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE D-16. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 16 HR SOAK

1976 Chevrolet Vega

TEST NO. 4

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.45	3.32	5.75	40.17	38.62	66.95	195.4	187.9	325.7	.54	.52	.90	19.32
2	.84	.80	2.27	10.91	10.34	29.49	218.2	206.9	589.8	1.05	1.00	2.84	27.45
3	.48	.46	.73	6.11	5.87	9.26	170.9	164.1	258.9	.22	.21	.33	11.78
4	.09	.09	.23	.80	.76	2.05	131.3	124.7	336.7	.23	.22	.59	14.69
5	.06	.06	.21	.41	.38	1.41	104.4	97.9	360.0	.15	.14	.52	15.51
6	.04	.04	.10	.37	.35	.95	144.6	138.6	370.7	.27	.26	.69	16.06
7	.03	.03	.07	.10	.10	.23	151.1	144.1	351.3	.34	.32	.79	14.87
8	.03	.03	.05	.35	.32	.63	122.4	113.3	218.6	.27	.25	.48	9.33
EIGHT BAG TOTAL	5.02			59.22			1238.3			3.07			
505 SEC BAG MASS	4.72			54.92			1227.9			3.15			
PERCENT DIFFERENCE	-6.36			-7.83			-.84			2.54			

TEST NO. 5

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	2.68	2.55	4.47	19.54	18.58	32.57	232.5	221.1	387.5	.86	.82	1.43	19.49
2	.84	.81	2.27	10.55	10.19	28.51	210.1	203.0	567.8	.86	.83	2.32	26.46
3	.38	.36	.58	8.44	8.05	12.79	185.7	177.1	281.3	.39	.37	.59	12.95
4	.07	.07	.18	.75	.71	1.92	136.8	129.4	350.7	.26	.25	.67	15.28
5	.04	.04	.14	.26	.24	.90	109.3	103.0	376.9	.16	.15	.55	16.19
6	.04	.04	.10	.45	.43	1.15	152.7	144.7	391.5	.30	.28	.77	16.97
7	.03	.03	.07	.21	.20	.49	150.2	144.5	349.4	.38	.37	.88	14.80
8	.01	.01	.02	.01	.01	.02	123.4	113.6	220.4	.24	.22	.43	9.36
EIGHT BAG TOTAL	4.09			40.21			1300.7			3.45			
505 SEC BAG MASS	3.58			38.76			1246.9			3.44			
PERCENT DIFFERENCE	-14.25			-3.74			-4.32			-.29			

TEST NO. 6

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.41	3.20	5.68	31.36	29.45	52.27	195.4	183.5	325.7	.53	.50	.88	18.32
2	.78	.76	2.11	10.95	10.65	24.59	217.1	211.1	586.6	.98	.95	2.65	27.31
3	.57	.54	.86	7.17	6.76	10.86	187.7	177.1	284.4	.27	.25	.41	12.99
4	.15	.14	.38	1.74	1.65	4.46	135.6	129.0	347.8	.26	.25	.67	15.35
5	.09	.08	.31	.23	.22	.79	113.8	106.6	392.6	.13	.12	.45	16.87
6	.07	.07	.18	.22	.21	.56	148.1	142.2	379.8	.26	.25	.67	16.44
7	.06	.06	.14	.51	.48	1.19	148.4	141.1	345.0	.33	.31	.77	14.68
8	.05	.05	.09	.27	.25	.48	123.5	115.1	220.6	.23	.21	.41	9.41
EIGHT BAG TOTAL	5.18			52.45			1269.6			2.99			
505 SEC BAG MASS	4.54			48.18			1221.5			3.23			
PERCENT DIFFERENCE	-14.10			-8.86			-3.94			7.43			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

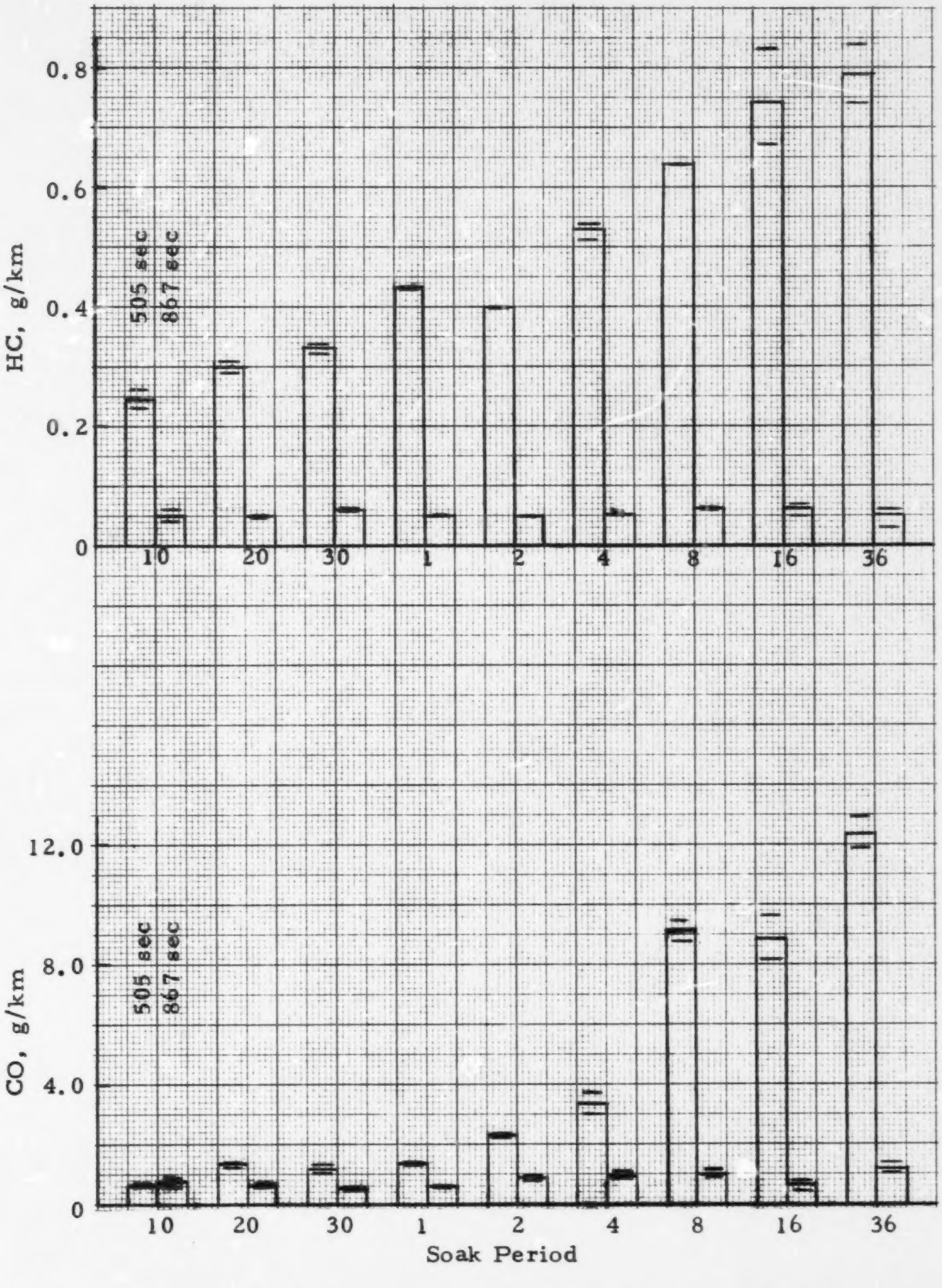

FIGURE D-1. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Chevrolet Vega

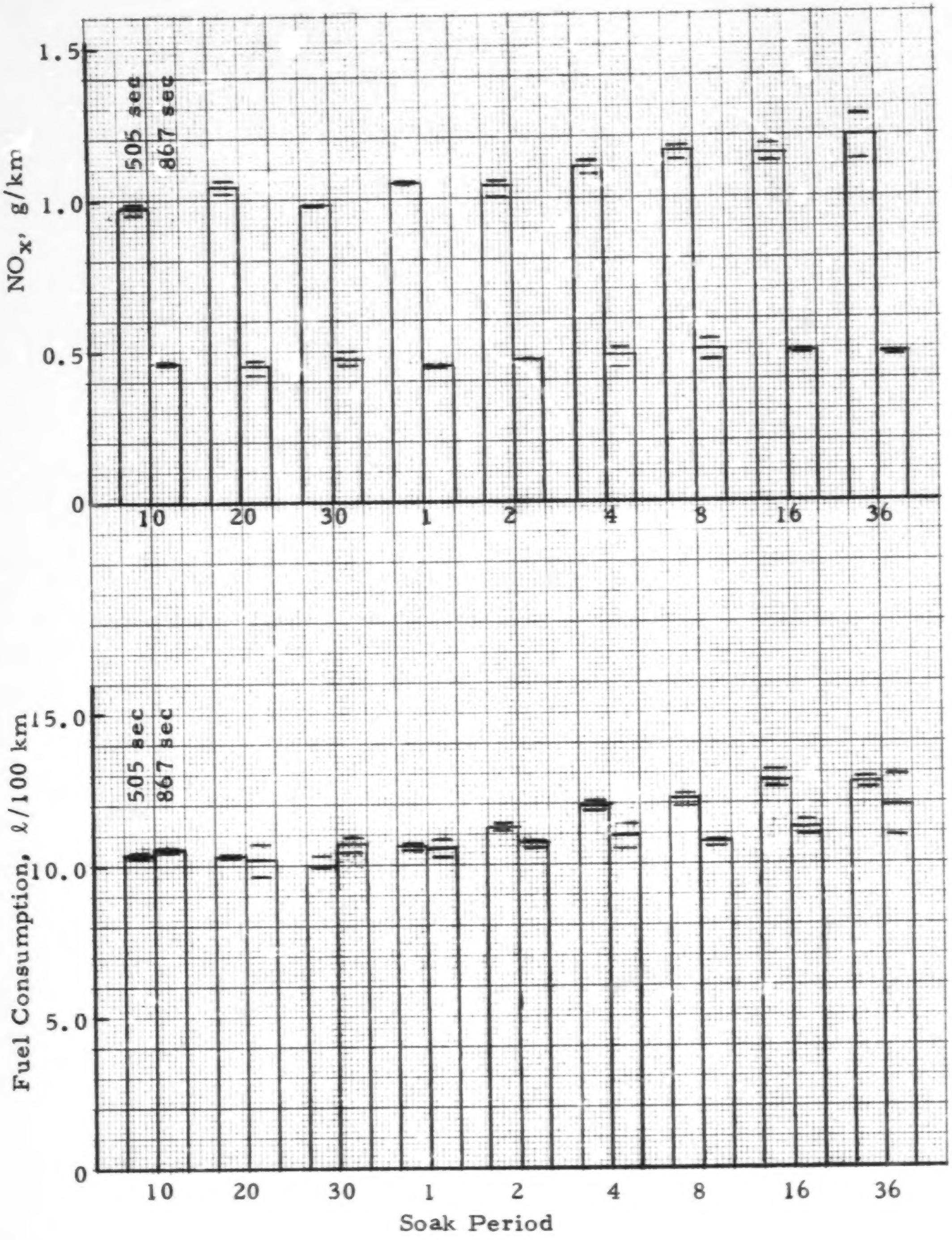

FIGURE D-2. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Chevrolet Vega

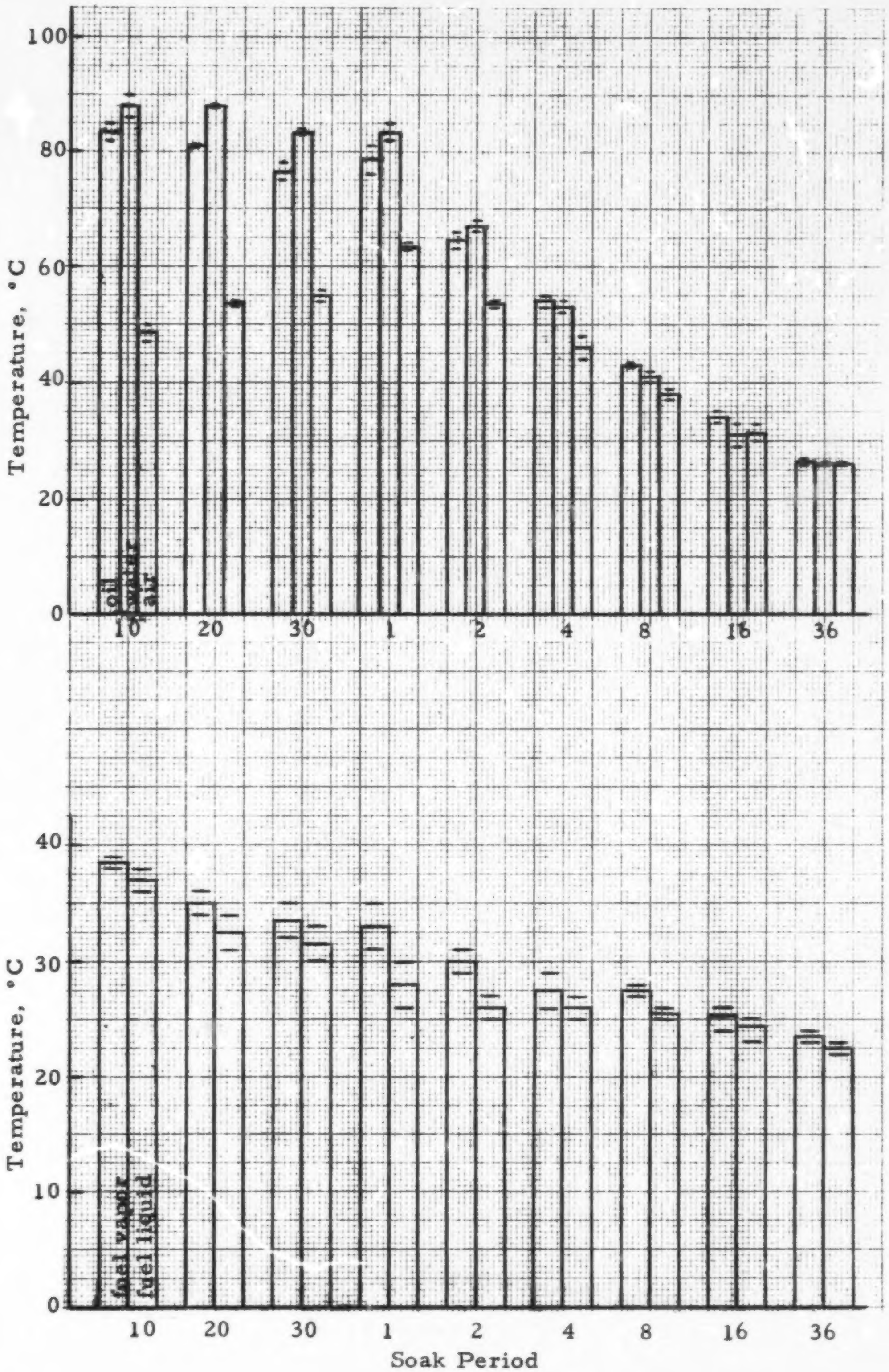

FIGURE D-3. AVERAGE TEMPERATURES DURING VARIOUS LENGTH SOAK PERIODS PRIOR TO DYNAMOMETER TESTS
1976 Chevrolet Vega

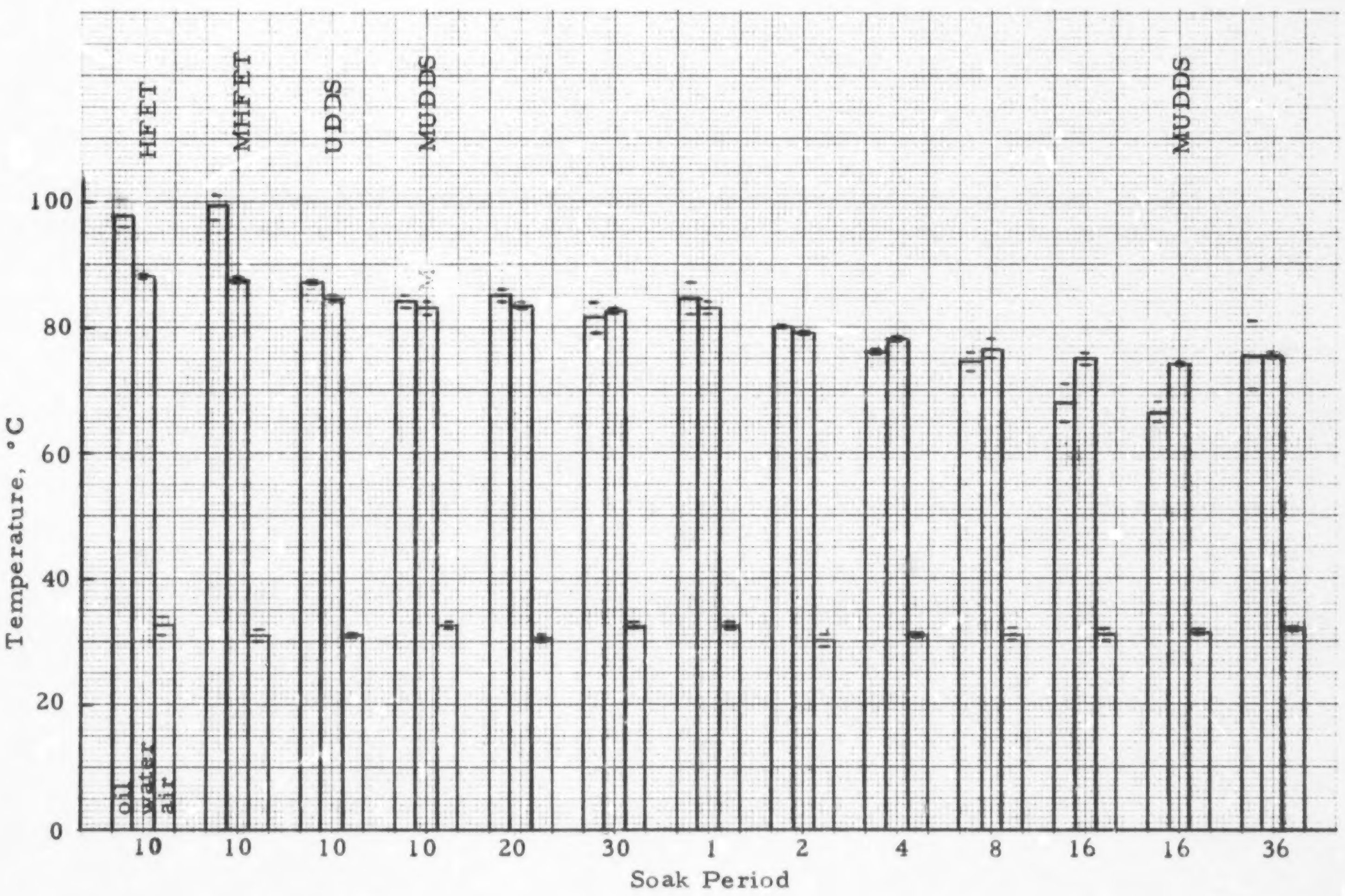

FIGURE D-4. AVERAGE OIL PAN, ENGINE WATER OUT, AND CARBURETOR INLET AIR TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Chevrolet Vega

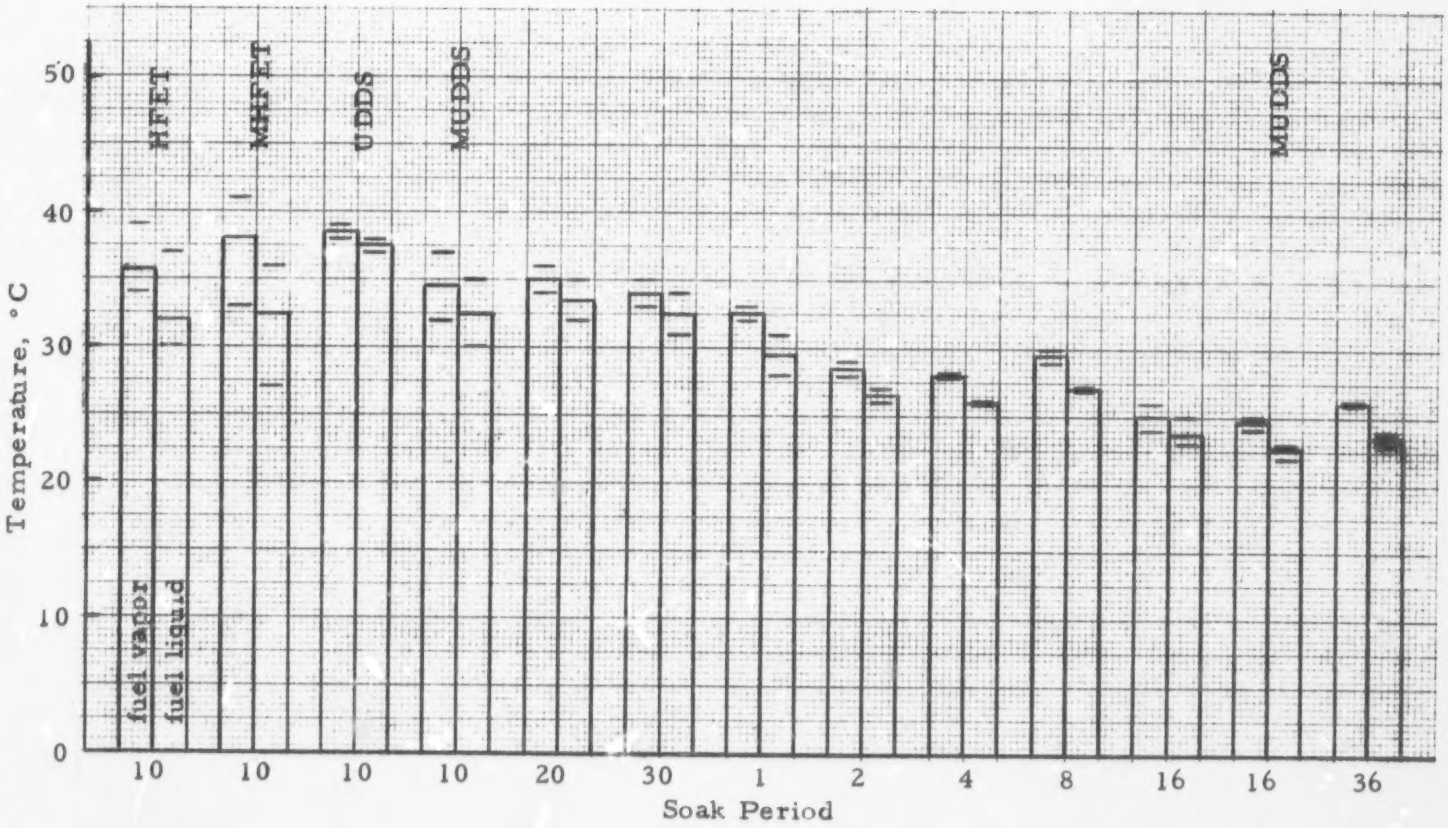

FIGURE D-5. AVERAGE FUEL TANK VAPOR AND FUEL TANK LIQUID TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Chevrolet Vega

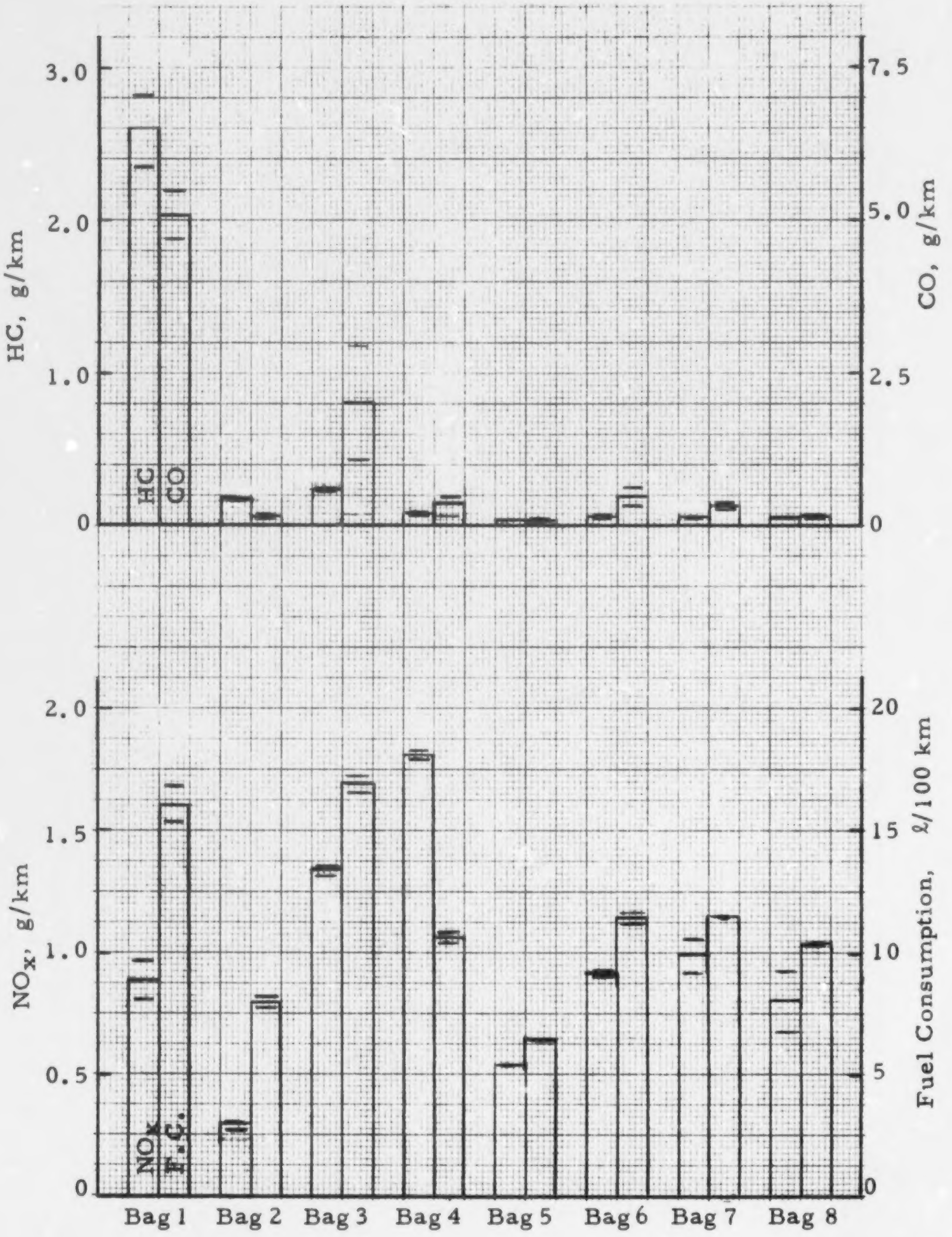

FIGURE D-6. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 10 MINUTE SOAK
1976 Chevrolet Vega

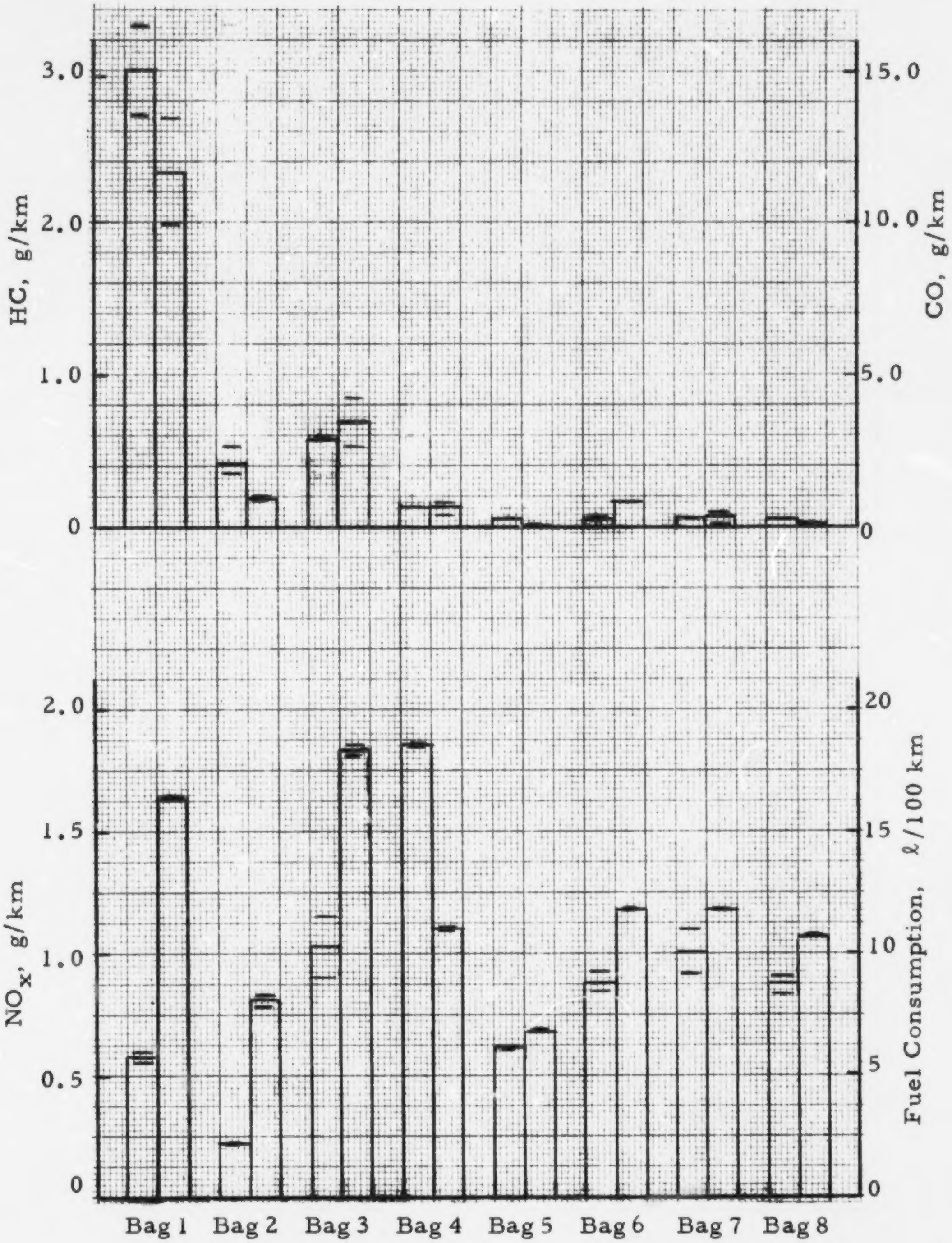

FIGURE D-7. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 20 MINUTE SOAK
1976 Chevrolet Vega

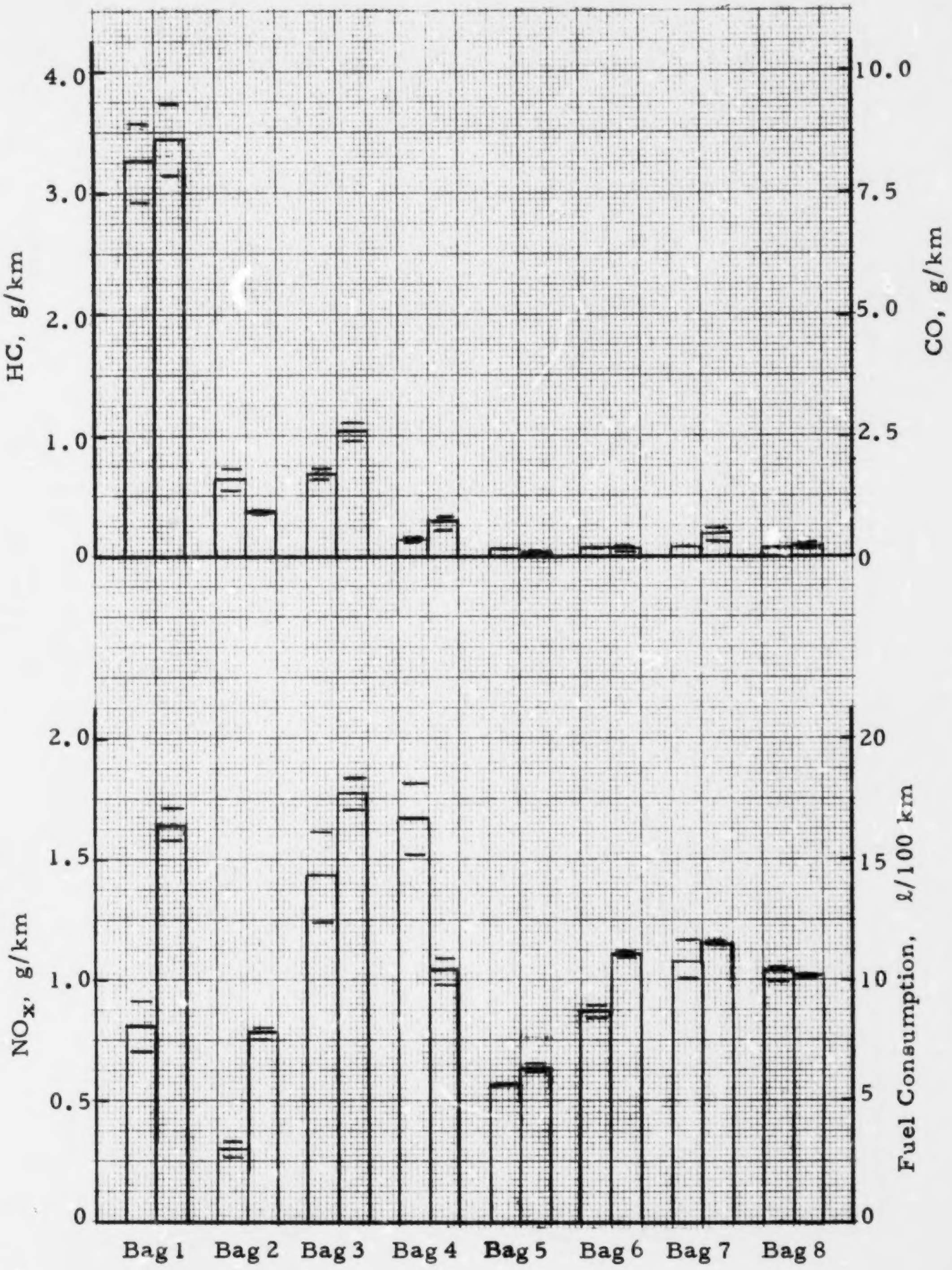

FIGURE D-8. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 30 MINUTE SOAK
1976 Chevrolet Vega

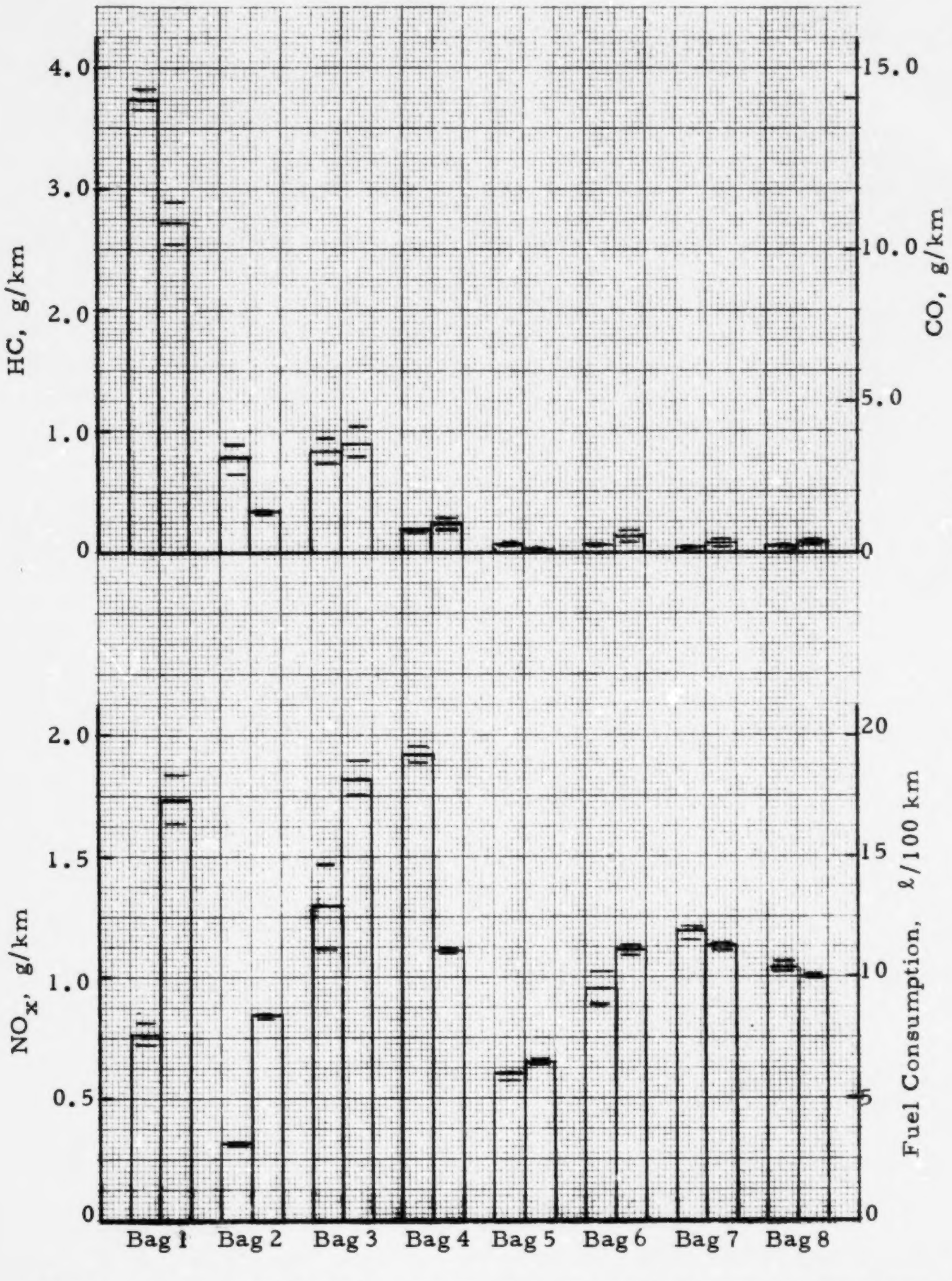

FIGURE D-9. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 1 HR SOAK
1976 Chevrolet Vega

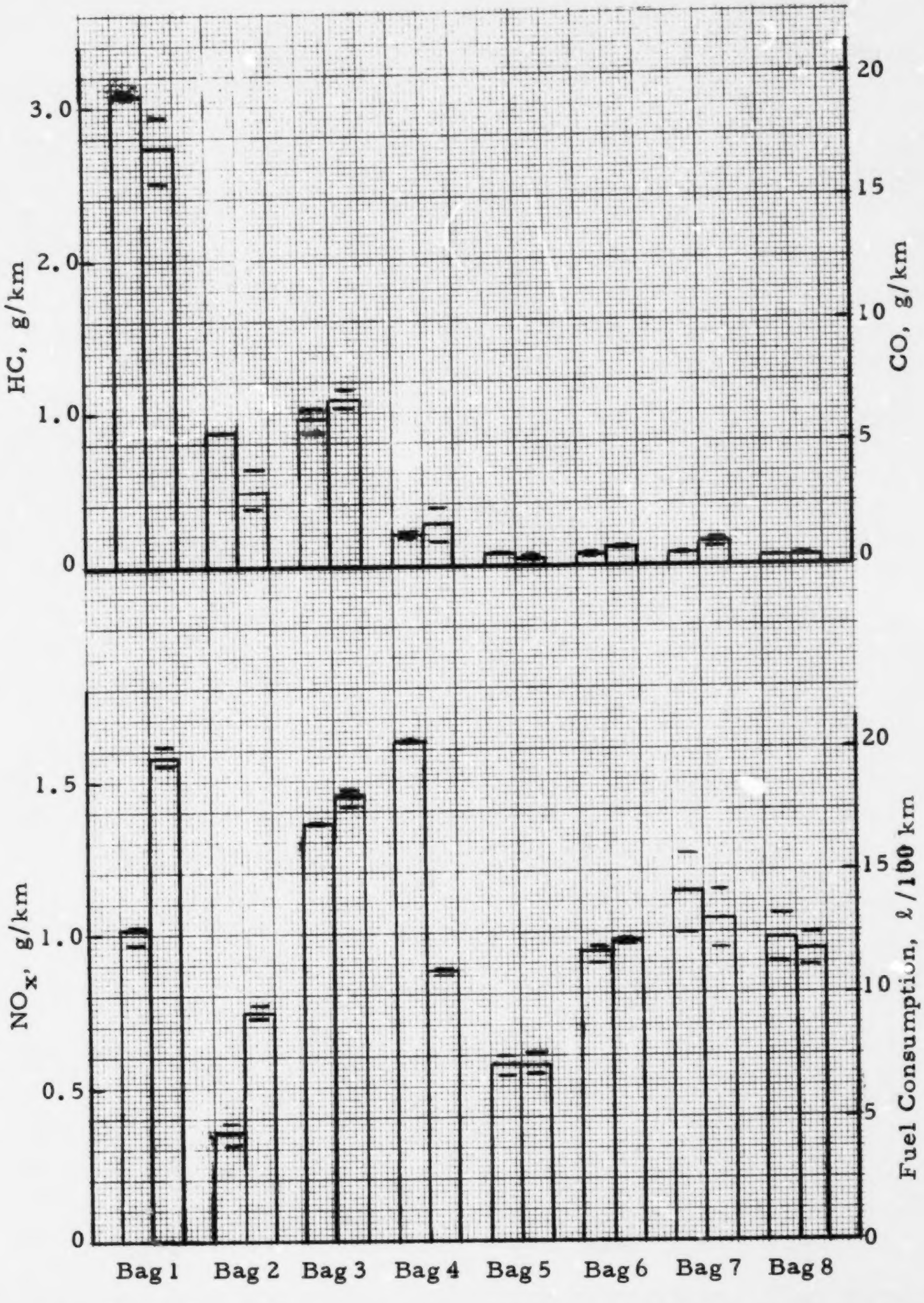

FIGURE D-10. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 2 HR SOAK
1976 Chevrolet Vega

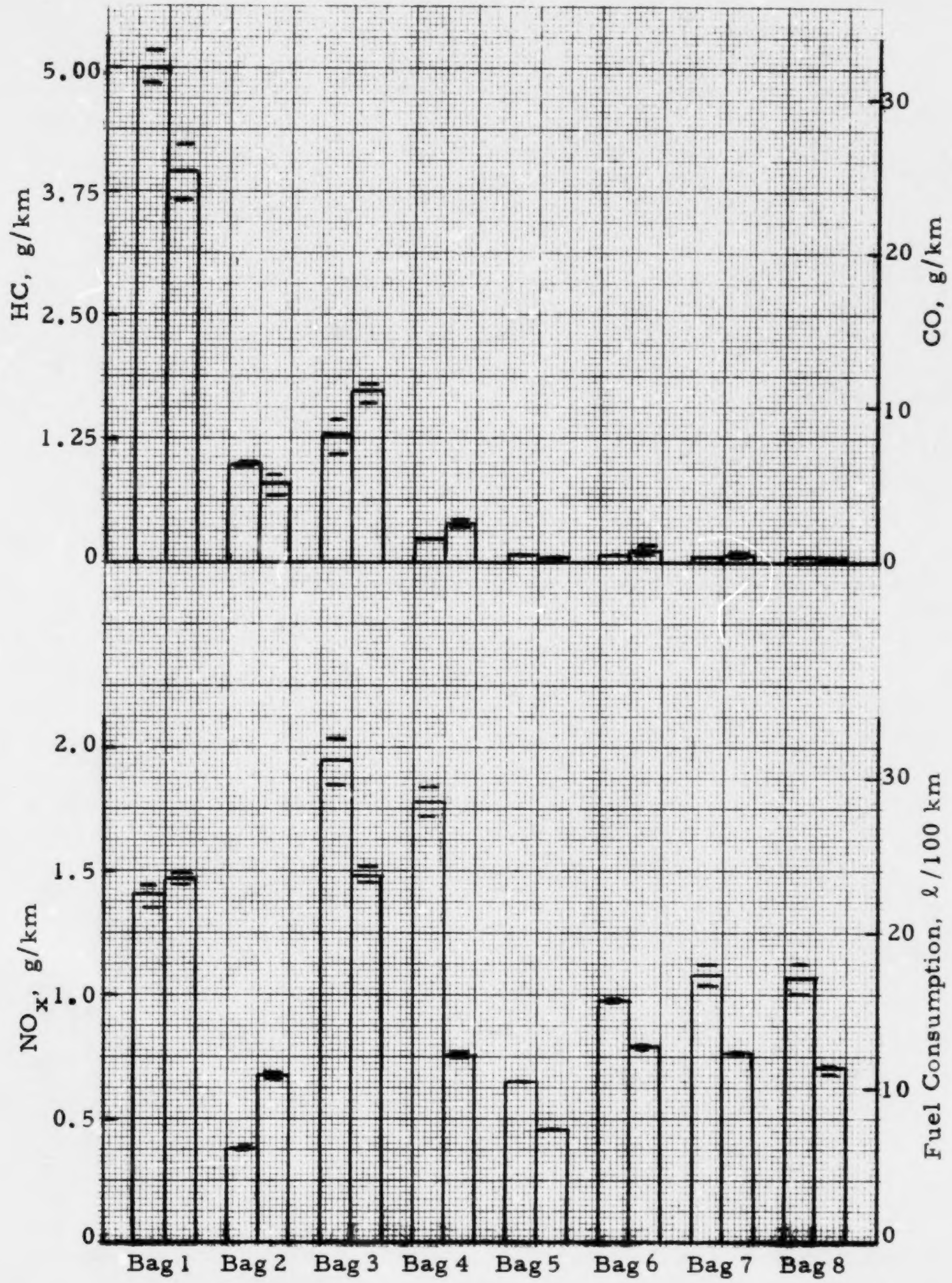

FIGURE D-11. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 4 HR SOAK
1976 Chevrolet Vega

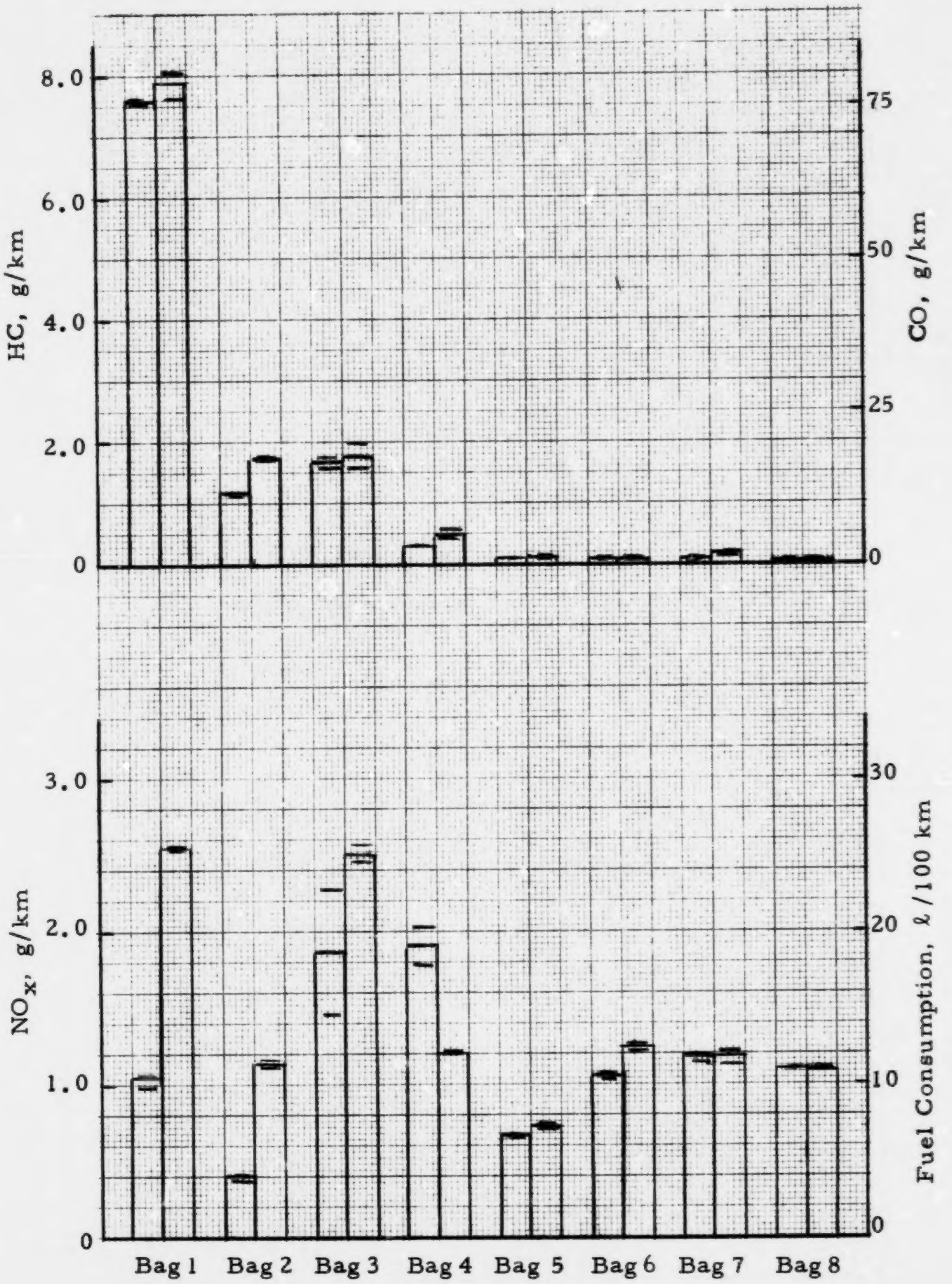

FIGURE D-12. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 8 HR SOAK
1976 Chevrolet Vega

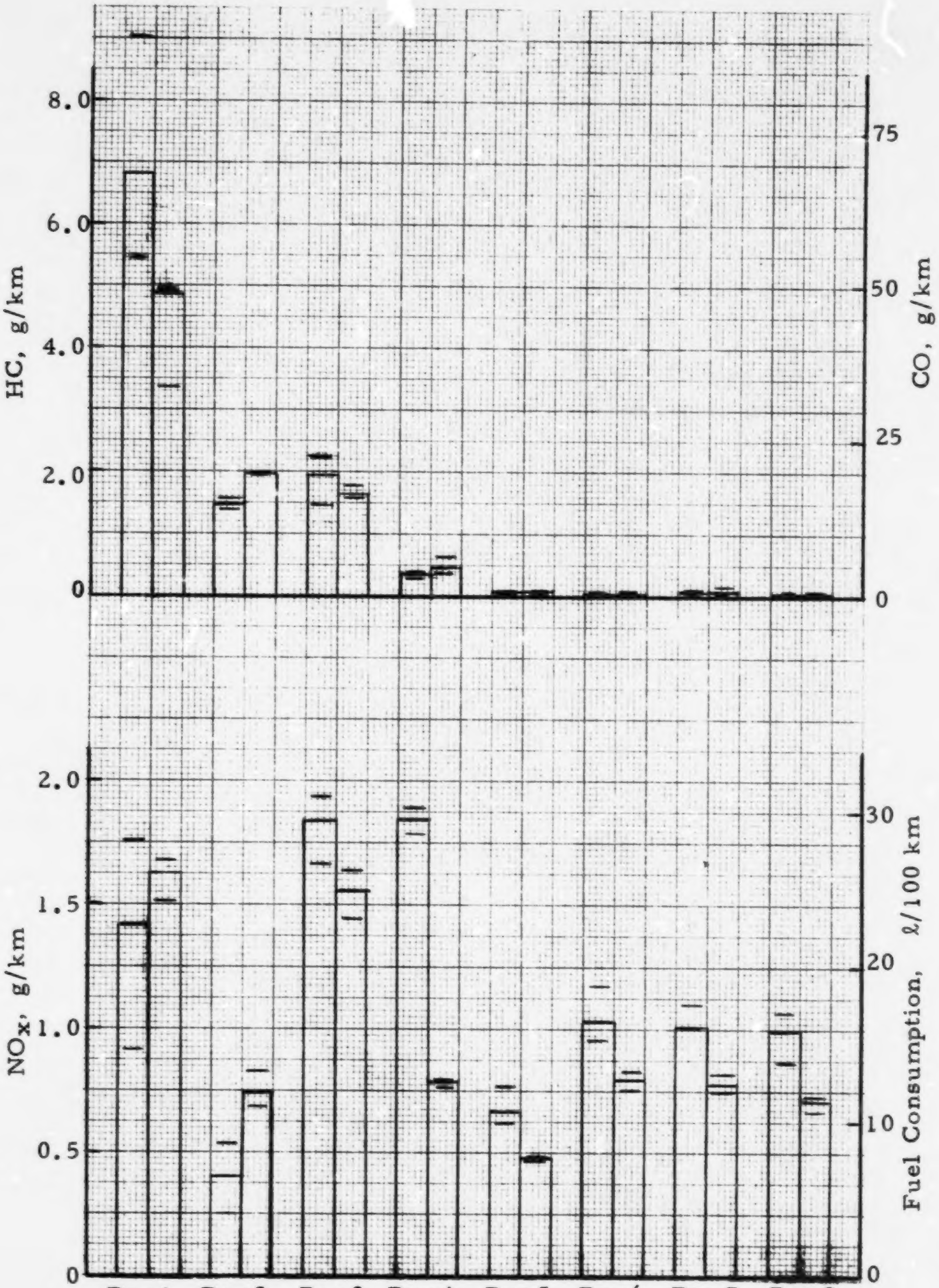

FIGURE D-13. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 16 HR SOAK
1976 Chevrolet Vega

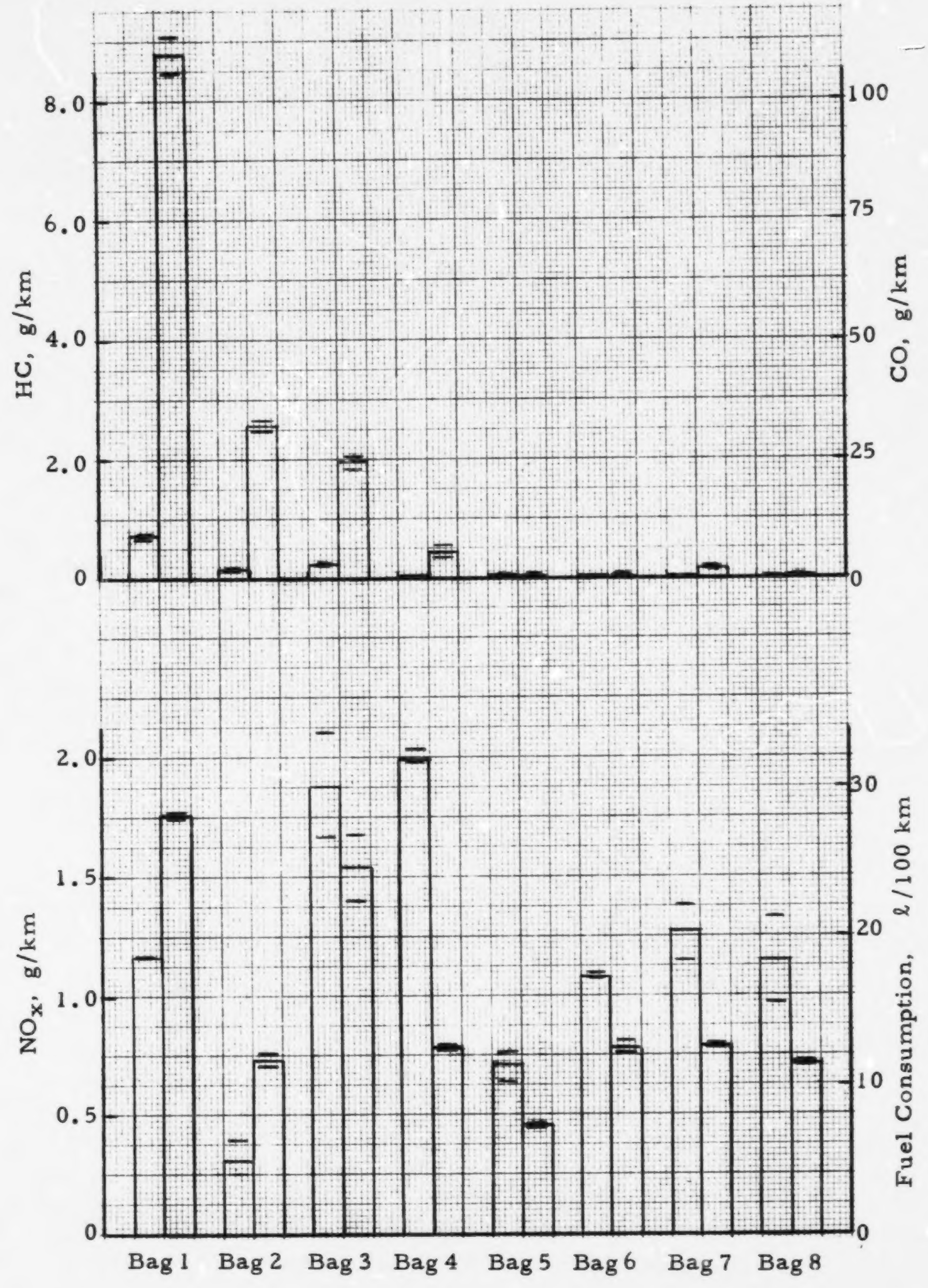

FIGURE D-14. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 36 HR SOAK
1976 Chevrolet Vega

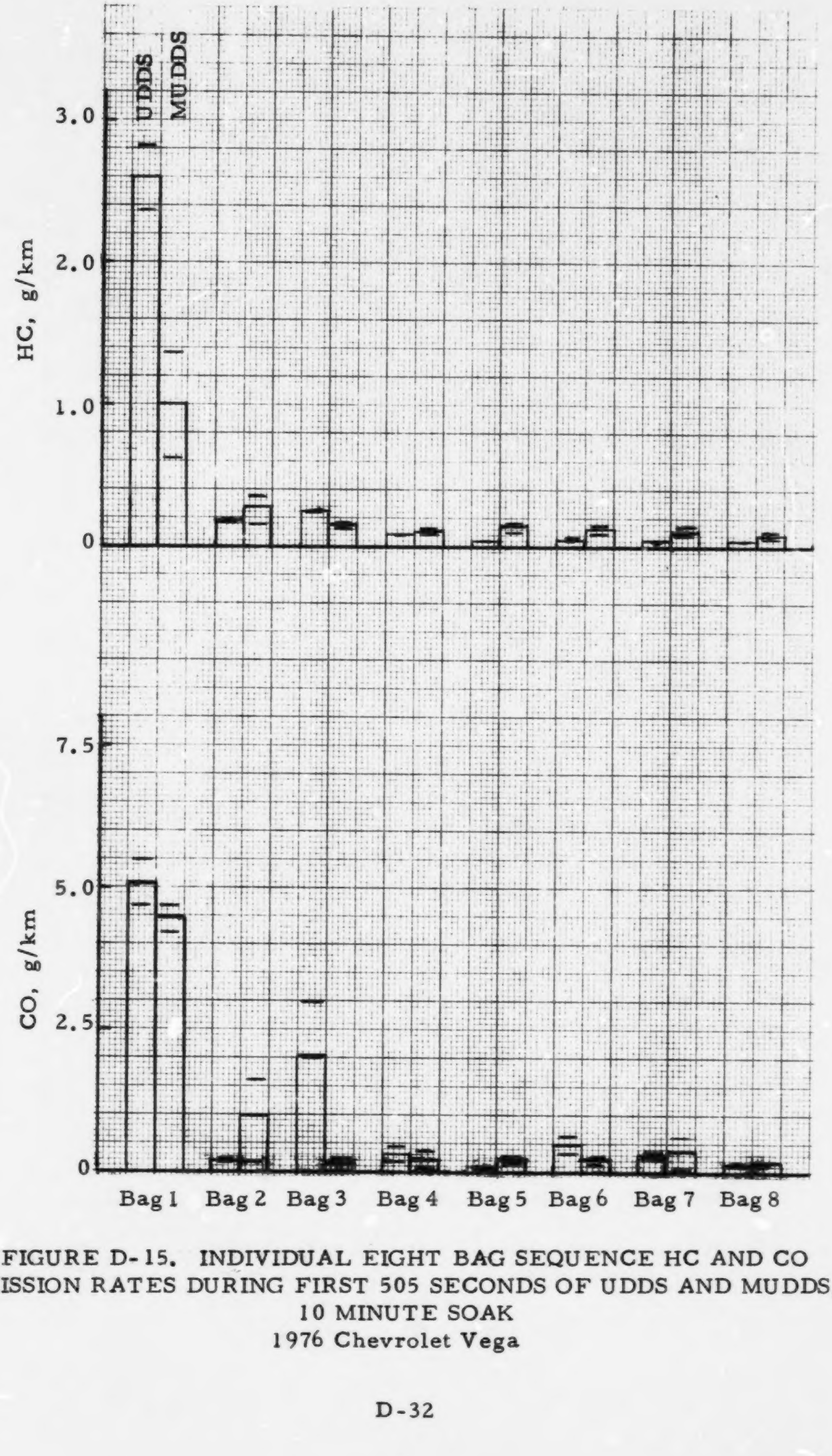

FIGURE D-15. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1976 Chevrolet Vega

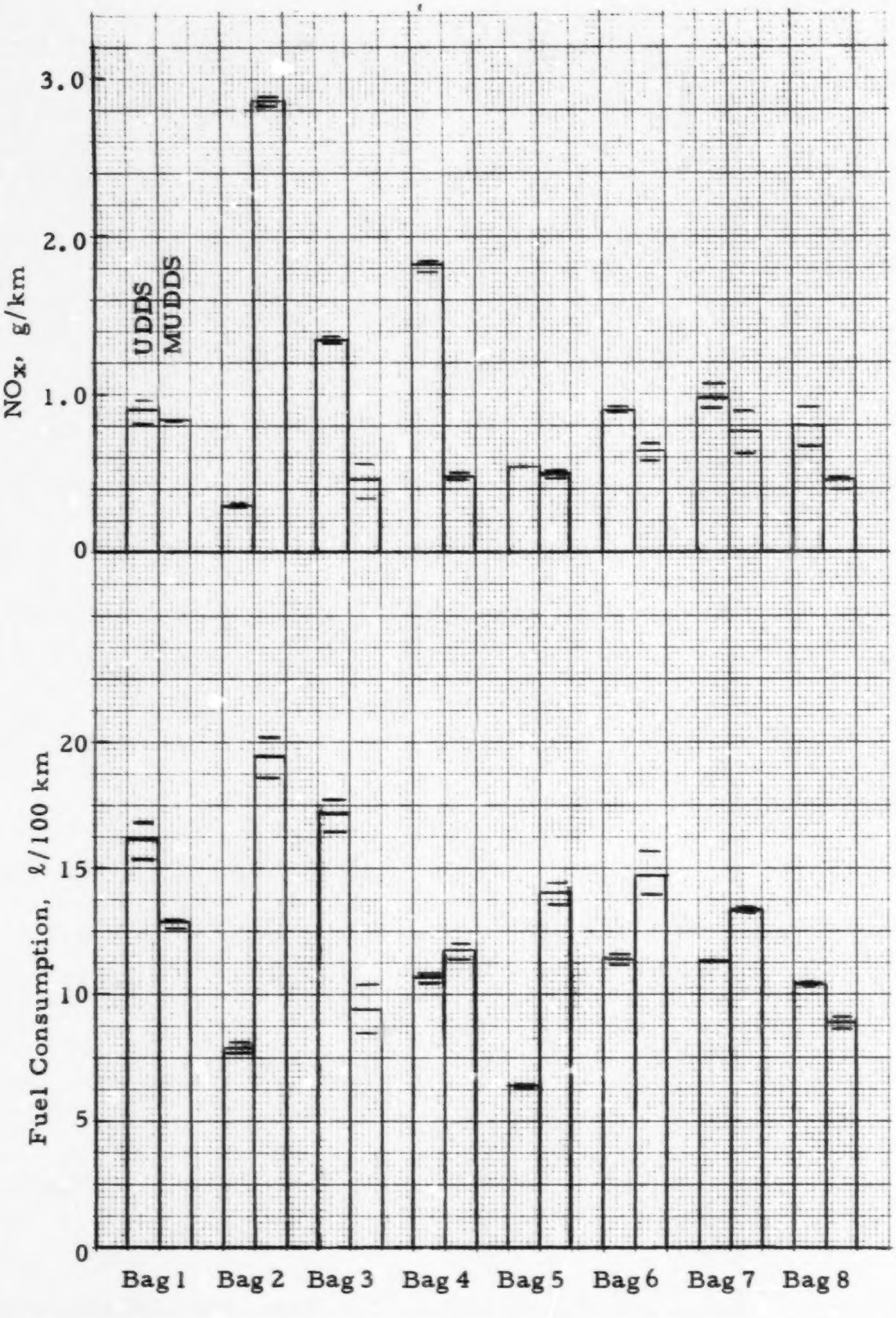

FIGURE D-16. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK 1976 Chevrolet Vega

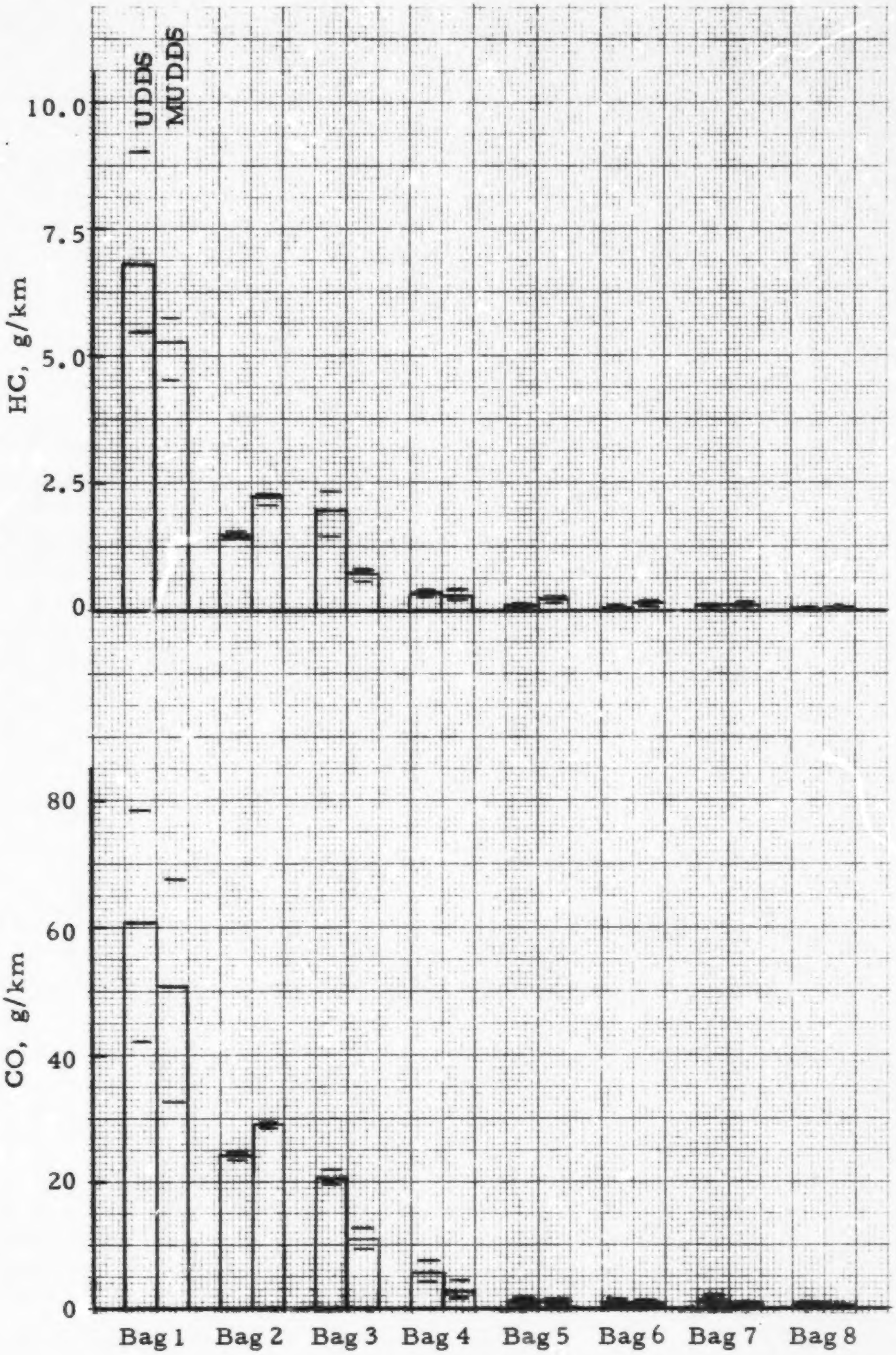

FIGURE D- 17. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Chevrolet Vega

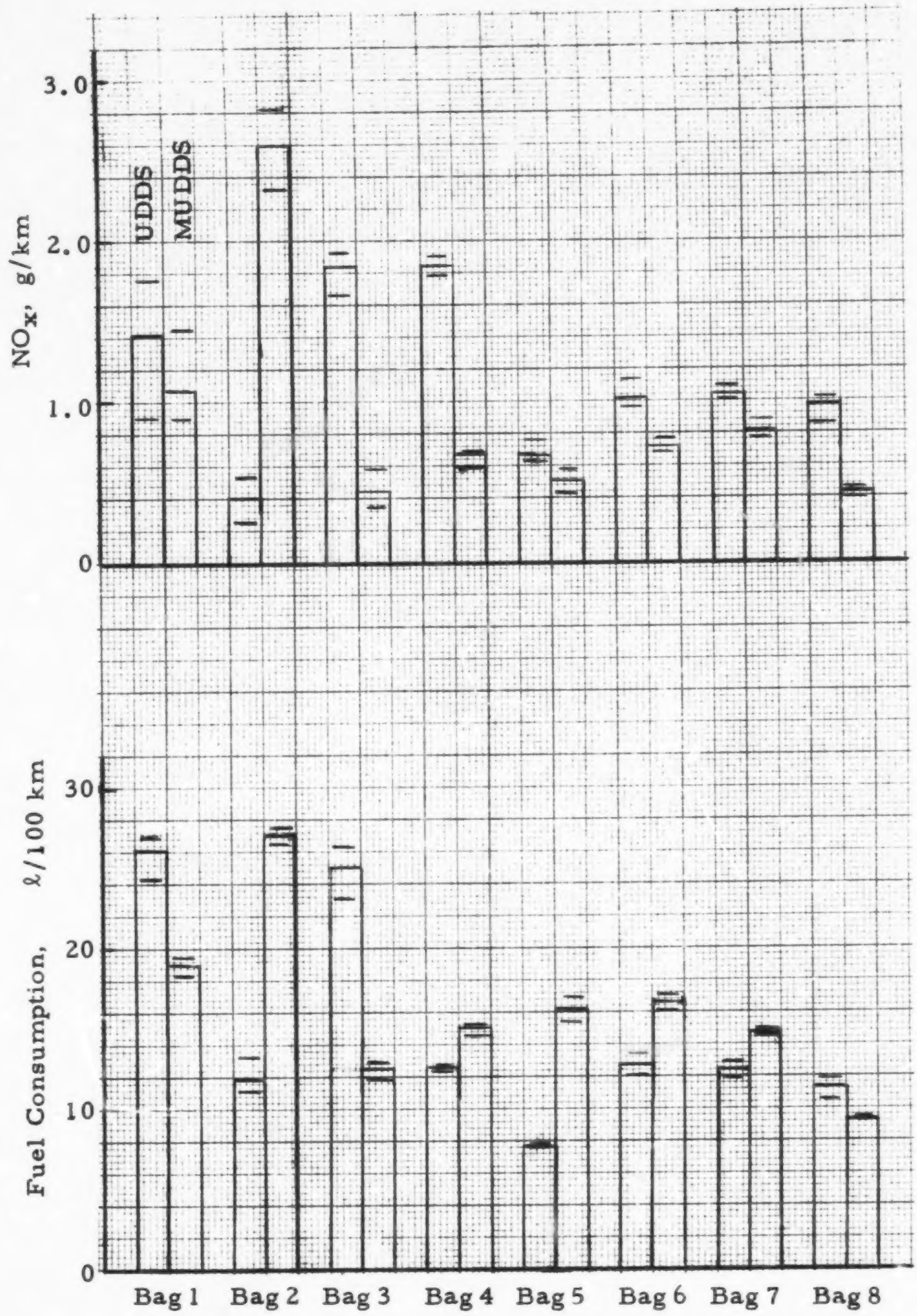

FIGURE D-18. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Chevrolet Vega

APPENDIX E

SUMMARIZED TEST DATA
1976 HONDA CIVIC CVCC

TABLE E-1. TEST NUMBERS CORRESPONDING TO DYNAMOMETER TESTS AT EACH CONDITION
1976 Honda Civic CVCC

Test Type	Replication 1	Replication 2	Replication 3
UDDS			
10 min soak	27	28	
20 min soak	25	26	
30 min soak	23	24	
1 hr soak	21	22	
2 hr soak	19	20	
4 hr soak	17	18	
8 hr soak	15	16	
16 hr soak	11	29	31
36 hr soak	13	14	
MUDDS			
10 min soak	9	10	
16 hr soak	6	7	8
HFET			
10 min soak	3	4	5
MHFET			
10 min soak	6	7	8

TABLE E-2. EMISSION AND FUEL ECONOMY RESULTS, URBAN DRIVING CYCLES
1976 Honda Civic CVCC

			HC, g/km			CO, g/km			NO$_x$, g/km			Fuel Consumption, ℓ/100 km		
Soak Length	Test No.	Date	505[1] sec	867[2] sec	Cycle[3]	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle	505 sec	867 sec	Cycle
						UDDS								
10 min	27	12/28/76	0.49	0.35	0.42	2.90	2.98	2.95	1.14	0.64	0.88	7.41	8.24	7.83
	28	12/28/76	0.56	0.34	0.45	3.10	2.89	2.99	1.23	0.66	0.93	7.51	8.11	7.81
		Average	0.53	0.35	0.44	3.00	2.94	2.97	1.19	0.65	0.91	7.46	8.18	7.82
			(0.85)[4]	(0.56)	(0.71)	(4.83)	(4.73)	(4.78)	(1.91)	(1.05)	(1.46)	(31.53)[5]	(28.78)	(30.08)
20 min	25	10/28/76	0.60	0.36	0.47	2.68	3.01	2.85	1.23	0.72	0.96	7.55	8.53	8.05
	26	10/28/76	0.60	0.35	0.47	2.77	3.09	2.94	1.20	0.67	0.92	7.58	8.17	7.87
		Average	0.60	0.36	0.47	2.73	3.05	2.89	1.22	0.69	0.94	7.57	8.35	7.96
			(0.97)	(0.58)	(0.76)	(4.39)	(4.91)	(4.65)	(1.96)	(1.11)	(1.51)	(31.08)	(28.17)	(29.55)
30 min	23	10/28/76	0.67	0.36	0.51	2.43	2.90	2.68	1.17	0.68	0.91	7.32	7.94	7.63
	24	10/28/76	0.57	0.31	0.43	2.74	2.83	2.79	1.20	0.66	0.92	7.58	8.12	7.84
		Average	0.62	0.34	0.47	2.59	2.87	2.74	1.19	0.67	0.92	7.45	8.03	7.74
			(1.00)	(0.55)	(0.76)	(4.17)	(4.62)	(4.41)	(1.91)	(1.08)	(1.48)	(31.58)	(29.30)	(30.39)
1 hr	21	10/28/76	0.47	0.33	0.39	2.55	3.10	2.84	1.22	0.74	0.97	7.55	8.66	8.11
	22	10/28/76	0.53	0.35	0.44	2.88	3.10	3.00	1.18	0.73	0.94	7.74	8.37	8.05
		Average	0.50	0.34	0.42	2.72	3.10	2.92	1.20	0.74	0.96	7.65	8.52	8.08
			(0.80	(0.55)	(0.68)	(4.38)	(4.99)	(4.70)	(1.93)	(1.19)	(1.54)	(30.75)	(27.61)	(29.11)
2 hr	19	10/28/76	0.65	0.28	0.45	3.00	3.05	3.03	1.20	0.67	0.92	8.46	8.16	8.28
	20	10/28/76	0.59	0.35	0.46	3.07	3.01	3.04	1.12	0.67	0.89	7.92	8.47	8.19
		Average	0.62	0.32	0.46	3.04	3.03	3.04	1.16	0.67	0.91	8.19	8.32	8.24
			(1.00)	(0.51)	(0.74)	(4.89)	(4.88)	(4.89)	(1.87)	(1.08)	(1.46)	(28.72)	(28.27)	(28.55)
4 hr	17	10/27/76	0.89	0.34	0.60	4.18	3.43	3.79	1.23	0.70	0.95	8.61	8.09	8.32
	18	10/27/76	0.65	0.36	0.50	3.67	3.24	3.45	1.17	0.73	0.94	8.29	8.73	8.51
		Average	0.77	0.35	0.55	3.93	3.33	3.62	1.20	0.72	0.95	8.45	8.41	8.42
			(1.24)	(0.56)	(0.88)	(6.32)	(5.36)	(5.82)	(1.93)	(1.16)	(1.53)	(27.84)	(27.97)	(27.94)
8 hr	15	10/25/76	1.05	0.31	0.67	4.01	3.53	3.76	1.32	0.74	1.02	8.80	8.79	8.78
	16	10/26/76	1.47	0.38	0.90	5.70	4.01	4.82	1.47	0.80	1.12	10.00	9.34	9.63
		Average	1.26	0.35	0.79	4.86	3.77	4.29	1.40	0.77	1.07	9.4	9.07	9.21
			(2.03)	(0.56)	(1.27)	(7.82)	(6.07)	(6.90)	(2.25)	(1.24)	(1.72)	(25.03)	(25.94)	(25.54)
16 hr	11	10/15/76	1.64	0.33	0.95	5.00	3.70	4.33	1.20	0.60	0.89	8.97	7.96	8.43
	29	11/2/76	1.24	0.29	0.74	4.73	3.21	3.94	1.25	0.78	1.01	8.71	8.68	8.68
	31	11/4/76	1.38	0.26	0.80	5.00	3.13	4.03	1.36	0.83	1.09	8.67	8.34	8.48
		Average	1.42	0.29	0.83	4.91	3.35	4.10	1.27	0.74	1.00	8.78	8.33	8.48
			(2.28)	(0.47)	(1.34)	(7.90)	(5.39)	(6.60)	(2.04)	(1.19)	(1.61)	(26.79)	(28.24)	(27.58)
36 hr	13	10/21/76	1.81	0.32	1.03	6.34	3.45	4.83	1.41	0.86	1.12	9.97	9.63	9.77
	14	10/23/76	1.48	0.27	0.85	5.43	3.71	4.53	1.49	0.83	1.14	9.52	8.71	9.08
		Average	1.65	0.30	0.94	5.89	3.58	4.68	1.45	0.84	1.13	9.75	9.17	9.43
			(2.65)	(0.48)	(1.51)	(9.48)	(5.76)	(7.53)	(2.33)	(1.35)	(1.82)	(24.13)	(25.63)	(24.95)
						MUDDS								
10 min	9	10/11/76	0.60	0.25	0.36	3.86	2.70	3.06	1.14	0.87	0.95	9.90	7.03	7.89
	10	10/11/76	0.81	0.26	0.43	3.86	2.74	3.09	1.03	1.01	1.02	11.73	7.52	8.79
		Average	0.71	0.26	0.40	3.86	2.72	3.08	1.09	0.94	0.99	10.82	7.28	8.34
			(1.14)	(0.42)	(0.64)	(6.21)	(4.38)	(4.96)	(1.75)	(1.51)	(1.59)	(21.74)	(32.31)	(28.21)
16 hr	6	10/6/76	3.46	0.21	1.20	8.80	3.15	4.87	1.25	0.89	1.00	11.12	7.83	8.81
	7	10/7/76	3.20	0.22	1.13	8.80	3.17	4.89	1.40	1.04	1.15	11.87	7.98	9.15
	8	10/8/76	3.13	0.25	1.13	9.86	3.18	5.22	1.45	1.06	1.18	12.25	9.21	10.11
		Average	3.26	0.23	1.15	9.15	3.17	4.99	1.37	1.00	1.11	11.75	8.34	9.36
			(5.25)	(0.37)	(1.85)	(14.72)	(5.10)	(8.03)	(2.20)	(1.61)	(1.79)	(20.02)	(28.21)	(25.13)

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[1] First 505 second bag results

[2] Last 867 second bag results

[3] 23 minute cycle composite

[4] g/mi

[5] mi/gal

TABLE E-3. EMISSION AND FUEL ECONOMY RESULTS OF HFET AND MODIFIED HFET

1976 Honda Civic CVCC

Test Cycle	Test No.	Date Run	HC, g/km	CO, g/km	NO_x, g/km	Fuel Consumption, ℓ/100 km
HFET	3	9/30/76	0.12	1.55	1.23	6.37
	4	10/1/76	0.10	1.47	1.25	6.42
	5	10/4/76	0.12	1.47	1.12	6.42
	Average		0.11	1.50	1.20	6.40
			(0.18)(1)	(2.41)(1)	(1.93)(1)	(36.76)(2)
MHFET	6	10/6/76	0.15	2.12	1.53	6.82
	7	10/7/76	0.13	1.88	1.61	6.66
	8	10/8/76	0.13	2.00	1.70	7.02
	Average		0.14	2.00	1.61	6.83
			(0.22)	(3.22)	(2.60)	(34.43)

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(1) g/mi
(2) mi/gal

TABLE E-4. SOAK TEMPERATURE DATA, 1976 HONDA CIVIC CVCC

Soak Length	Test No.	Soak Date(s)	Temperature, °C Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
10 min	27	10/28/76	58	41	54	104	88	102	103	99	101	46	44	45	43	41	42
	28	10/28/76	58	39	53	103	89	102	105	99	103	48	47	48	45	44	45
	Overall Average				54			102			102			47			44
20 min	25	10/28/76	61	41	53	104	90	99	104	93	95	41	39	40	38	36	37
	26	10/28/76	62	37	54	104	100	102	104	102	103	44	42	43	40	39	40
	Overall Average				54			101			99			42			38
30 min	23	10/28/76	60	38	56	103	90	100	101	81	93	43	35	38	39	35	37
	24	10/28/76	62	37	55	105	90	98	105	85	92	38	35	36	34	32	33
	Overall Average				56			99			93			37			35
1 hr	21	10/28/76	59	40	54	103	72	90	101	67	83	38	33	35	35	31	32
	22	10/28/76	61	40	55	104	78	88	102	71	82	43	35	39	38	33	36
	Overall Average				55			89			83			37			34
2 hr	19	10/28/76	58	34	49	106	49	73	102	51	68	35	24	26	31	23	24
	20	10/28/76	54	36	46	84	46	60	92	49	63	35	27	29	32	27	28
	Overall Average				48			67			66			28			26
4 hr	17	10/27/76	62	33	46	106	36	59	102	34	55	36	22	24	33	20	23
	18	10/27/76	61	36	47	105	40	60	101	40	58	33	26	27	30	26	27
	Overall Average				47			60			57			26			25
8 hr	15	10/25/76	59	28	37	103	28	43	100	28	43	35	23	25	34	25	25
	16	10/26/76	59	29	37	103	29	43	104	29	43	34	26	25	30	26	24
	Overall Average				37			43			43			25			25
16 hr	11	10/14-10/15/76	59	25	32	101	25	36	102	26	36	39	26	26	36	26	26
	29	11/1-11/2/76	61	24	32	104	24	35	102	23	35	36	21	25	32	21	24
	31	11/3-11/4/76	62	26	32	104	26	36	103	26	36	41	24	26	37	22	26
	Overall Average				32			36			36			25			25
36 hr	13	10/19-10/21/76	58	24	26	106	24	27	100	23	27	37	22	22	34	22	22
	14	10/21-10/23/77	62	25	27	104	24	28	102	23	28	35	21	22	31	20	21
	Overall Average				27			28			28			22			22

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE E-5. TEMPERATURES MEASURED DURING VARIOUS TRANSIENT CYCLES
1976 Honda Civic CVCC

Soak Length	Test No.	Date	Temperature, °C														
			Inlet Air			Water Out			Oil Sump			Fuel Tank Vapor			Fuel Tank Liquid		
			Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
UDDS																	
10 min	27	10/28/76	58	37	39	101	86	90	106	94	103	47	45	46	44	43	43
	28	10/29/76	58	37	39	101	86	90	106	94	103	48	47	48	45	44	44
	Overall Average				39			90			103			47			44
20 min	25	10/28/76	60	36	38	99	82	90	105	88	102	42	40	41	39	38	39
	26	10/28/76	50	36	38	97	78	90	105	88	102	43	41	42	41	40	41
	Overall Average				38			90			102			42			40
30 min	23	10/28/76	59	34	37	96	78	90	104	77	100	35	33	34	32	30	31
	24	10/28/76	60	36	38	96	78	89	104	82	100	38	36	37	36	34	35
	Overall Average				38			90			100			36			33
1 hr	21	10/28/76	55	33	37	104	69	89	103	67	97	40	33	35	35	31	32
	22	10/28/76	57	35	38	96	75	89	103	70	97	41	33	36	37	33	33
	Overall Average				38			89			97			36			33
2 hr	19	10/28/76	44	28	33	96	49	86	102	49	92	33	24	26	29	23	24
	20	10/28/76	40	28	32	96	45	86	101	48	91	35	27	30	32	26	28
	Overall Average				33			86			92			28			26
4 hr	17	10/27/76	41	28	34	97	35	84	101	34	89	33	22	25	28	21	23
	18	10/27/76	41	29	35	97	40	84	101	40	89	36	25	29	31	25	27
	Overall Average				35			84			89			27			25
8 hr	15	10/25/76	41	28	35	96	28	82	102	28	86	33	23	28	30	23	26
	16	10/26/76	43	28	35	97	29	83	103	29	88	35	25	29	32	25	27
	Overall Average				35			83			87			29			27
16 hr	11	10/15/76	41	26	32	96	26	81	103	26	85	36	25	28	32	25	26
	29	11/2/76	40	24	33	96	24	82	103	23	86	29	21	24	28	21	22
	31	11/4/76	40	26	33	96	26	82	103	26	87	35	24	28	30	24	25
	Overall Average				33			81			86			27			24
36 hr	13	10/21/76	41	24	32	96	23	80	102	23	84	32	21	24	28	21	22
	14	10/23/76	42	24	35	96	25	81	102	25	85	35	22	27	30	22	23
	Overall Average				34			81			85			26			24
MUDDS																	
10 min	9	10/11/76	54	38	40	110	87	91	110	100	103	43	39	41	38	34	36
	10	10/11/76	61	38	40	104	86	91	105	95	102	47	43	45	43	41	42
	Overall Average				40			91			103			43			39
16 hr	6	10/6/76	36	21	29	95	21	84	105	21	85	29	21	24	25	21	22
	7	10/7/76	38	22	29	95	22	81	106	22	83	31	22	25	25	20	23
	8	10/8/76	37	22	29	97	22	81	106	22	83	28	19	22	24	18	20
	Overall Average				29			82			84			24			22
HFET																	
10 min	3	9/30/76	49	34	35	101	72	96	117	87	106	37	34	35	31	29	31
	4	10/1/76	49	35	37	102	83	98	118	92	109	37	35	36	32	28	31
	5	10/4/76	52	34	36	98	75	94	116	90	107	37	34	35	32	29	31
	Overall Average				36			96			107			35			31
MHFET																	
10 min	6	10/6/76	59	33	36	106	79	96	121	88	108	35	34	34	33	31	31
	7	10/7/76	54	36	38	109	84	99	122	95	111	41	35	38	34	32	33
	8	10/8/76	55	36	38	110	83	99	121	92	112	38	35	36	32	29	31
	Overall Average				37			98			110			36			32

Max and min from trace, average by integrator
Overall average is average for all replications

TABLE E-6. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 10 MINUTE SOAK
1976 Honda Civic CVCC

TEST NO. 27

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.12	1.06	3.20	2.65	2.51	7.57	91.9	86.9	262.5	.34	.32	.97	12.01
2	.29	.28	.40	1.28	1.23	1.78	108.0	104.0	150.0	.52	.50	.72	6.54
3	.26	.25	1.08	1.03	.98	4.29	66.4	63.0	276.6	.25	.24	1.04	12.17
4	.48	.45	.35	4.64	4.40	3.39	250.6	237.5	182.9	2.74	2.60	2.00	8.10
5	.12	.12	.09	1.78	1.71	1.27	177.6	170.2	126.8	1.52	1.46	1.09	5.51
6	.19	.18	.35	1.66	1.58	3.02	103.8	98.5	188.7	.64	.61	1.16	8.35
7	.18	.17	.43	1.54	1.47	3.67	78.9	75.4	187.8	.54	.52	1.29	8.35
8	.25	.23	.35	2.50	2.34	3.47	127.8	119.5	177.5	.93	.87	1.29	7.82
EIGHT BAG TOTAL	2.89			17.08			1005.0			7.48			
505 SEC BAG MASS	2.83			16.78			966.4			6.59			
PERCENT DIFFERENCE	-2.12			-1.79			-3.99			-13.51			

TEST NO. 28

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.50	1.44	4.29	2.45	2.35	7.00	90.9	87.1	259.7	.35	.34	1.00	12.00
2	.30	.29	.42	1.24	1.18	1.72	106.4	101.7	147.8	.56	.54	.78	6.45
3	.23	.22	.96	.94	.89	3.92	63.2	60.1	263.5	.24	.23	1.00	11.58
4	.56	.53	.41	5.87	5.52	4.28	254.1	238.9	185.4	2.89	2.72	2.11	8.27
5	.13	.12	.09	1.81	1.73	1.29	174.8	167.3	124.9	1.67	1.60	1.19	5.43
6	.18	.17	.33	1.49	1.41	2.71	102.0	96.8	185.4	.69	.66	1.25	8.19
7	.16	.15	.38	1.41	1.35	3.36	81.2	77.5	193.2	.56	.54	1.33	8.56
8	.25	.23	.35	2.05	1.91	2.85	129.8	120.7	180.3	1.13	1.05	1.57	7.89
EIGHT BAG TOTAL	3.31			17.26			1002.4			8.09			
505 SEC BAG MASS	3.24			17.90			977.4			7.12			
PERCENT DIFFERENCE	-2.16			3.58			-2.56			-13.62			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-7. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 20 MINUTE SOAK
1976 Honda Civic CVCC

TEST NO. 25

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.85	1.78	5.29	2.99	2.88	8.54	105.7	101.7	301.9	.46	.44	1.31	14.01
2	.31	.30	.43	1.29	1.23	1.79	117.6	112.0	163.4	.51	.49	.71	7.11
3	.27	.26	1.12	1.33	1.27	5.54	75.3	72.1	313.8	.32	.31	1.33	13.84
4	.38	.36	.28	3.11	2.93	2.27	264.4	249.4	193.0	2.98	2.81	2.18	8.44
5	.13	.12	.09	1.77	1.67	1.26	184.6	174.4	131.8	1.54	1.46	1.10	5.73
6	.19	.18	.35	1.51	1.46	2.75	111.6	107.6	202.9	.65	.63	1.18	8.94
7	.16	.15	.38	1.34	1.27	3.19	90.1	85.5	214.5	.52	.49	1.24	9.46
8	.24	.22	.33	2.39	2.24	3.32	137.5	128.7	190.9	.93	.87	1.29	8.37
EIGHT BAG TOTAL	3.53			15.73			1086.6			7.91			
505 SEC BAG MASS	3.45			15.48			986.3			7.12			
PERCENT DIFFERENCE	-2.32			-1.61			-10.17			-11.10			

TEST NO. 26

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.58	1.49	4.51	3.01	2.83	8.60	97.2	91.4	277.8	.39	.37	1.11	12.90
2	.38	.36	.53	1.31	1.25	1.82	111.7	106.2	155.2	.55	.52	.76	6.78
3	.26	.25	1.08	1.00	.97	4.17	66.5	64.5	277.1	.23	.22	.96	12.19
4	.49	.46	.36	4.05	3.80	2.96	260.6	244.7	190.2	2.90	2.72	2.12	8.38
5	.14	.13	.10	1.87	1.80	1.34	181.9	174.9	130.0	1.62	1.56	1.16	5.65
6	.19	.18	.35	1.46	1.37	2.65	101.8	95.7	185.0	.63	.59	1.15	8.17
7	.18	.17	.43	1.59	1.52	3.79	85.3	81.6	203.1	.53	.51	1.26	9.02
8	.21	.20	.29	1.54	1.45	2.14	136.1	127.8	189.0	.88	.83	1.22	8.21
EIGHT BAG TOTAL	3.43			15.83			1041.2			7.73			
505 SEC BAG MASS	3.47			15.98			989.3			6.92			
PERCENT DIFFERENCE	1.15			.94			-5.24			-11.71			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-8. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 30 MINUTE SOAK
1976 Honda Civic CVCC

TEST NO. 23

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.60	1.52	4.57	1.95	1.85	5.57	98.8	93.6	282.2	.34	.32	.97	12.89
2	.42	.40	.58	1.39	1.32	1.93	117.5	111.4	163.2	.53	.50	.74	7.14
3	.32	.30	1.33	1.03	.98	4.29	66.6	63.3	277.5	.27	.26	1.12	12.25
4	.58	.55	.42	4.26	4.05	3.11	256.5	243.9	187.2	3.03	2.88	2.21	8.27
5	.18	.17	.13	1.77	1.69	1.26	181.9	173.5	129.9	1.60	1.53	1.14	5.65
6	.25	.24	.45	1.61	1.52	2.93	106.1	100.4	192.9	.67	.63	1.22	8.54
7	.23	.22	.55	1.64	1.58	3.90	79.4	76.5	189.1	.57	.55	1.36	8.45
8	.38	.36	.53	1.68	1.57	2.33	124.2	116.3	172.5	.83	.78	1.15	7.55
EIGHT BAG TOTAL	3.96			15.33			1031.0			7.84			
505 SEC BAG MASS	3.88			14.04			956.2			6.74			
PERCENT DIFFERENCE	-2.06			-9.19			-7.82			-16.32			

TEST NO. 24

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.68	1.61	4.80	2.17	2.08	6.20	105.2	100.9	300.7	.37	.35	1.06	13.75
2	.28	.26	.39	1.27	1.20	1.76	111.9	105.9	155.4	.53	.50	.74	6.77
3	.29	.28	1.21	1.65	1.57	6.87	73.9	70.3	307.9	.32	.30	1.33	13.69
4	.48	.46	.35	4.43	4.23	3.23	252.4	240.7	184.2	2.96	2.82	2.16	8.19
5	.11	.10	.08	1.82	1.73	1.30	179.4	170.1	128.2	1.61	1.53	1.15	5.57
6	.16	.15	.29	1.30	1.24	2.36	104.3	99.5	189.6	.64	.61	1.16	8.33
7	.15	.14	.36	1.45	1.39	3.45	81.2	77.7	193.4	.55	.53	1.31	8.57
8	.21	.20	.29	1.99	1.86	2.76	124.6	116.2	173.0	.88	.82	1.22	7.57
EIGHT BAG TOTAL	3.36			16.08			1032.9			7.86			
505 SEC BAG MASS	3.27			15.83			989.5			6.95			
PERCENT DIFFERENCE	-2.75			-1.58			-4.38			-13.09			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-9. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 1 HR SOAK

1976 Honda Civic CVCC

TEST NO. 21

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	.85	.81	2.43	2.04	1.94	5.83	99.9	94.8	285.3	.26	.25	.74	12.75
2	.33	.31	.46	1.27	1.21	1.76	122.6	116.4	170.3	.50	.47	.69	7.41
3	.26	.25	1.08	1.41	1.34	5.87	74.5	70.9	310.3	.24	.23	1.00	13.71
4	.84	.80	.61	5.09	4.83	3.72	272.6	258.8	199.0	2.99	2.84	2.18	8.84
5	.13	.12	.09	1.79	1.64	1.28	190.9	180.4	136.4	1.62	1.53	1.16	5.92
6	.19	.18	.35	1.60	1.53	2.91	105.7	101.4	192.3	.60	.58	1.09	8.50
7	.16	.15	.38	1.57	1.51	3.74	86.4	83.2	205.7	.53	.51	1.26	9.12
8	.19	.17	.25	1.61	1.51	2.24	123.5	115.9	171.5	.78	.73	1.08	7.46
EIGHT BAG TOTAL	2.94			16.38			1076.1			7.52			
505 SEC BAG MASS	2.71			14.74			989.8			7.05			
PERCENT DIFFERENCE	-8.49			-11.13			-8.71			-6.67			

TEST NO. 22

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.12	1.05	3.20	2.27	2.14	6.49	102.5	96.6	292.9	.31	.29	.89	13.22
2	.28	.27	.39	1.29	1.23	1.79	121.0	115.8	168.1	.46	.44	.64	7.31
3	.25	.24	1.09	1.35	1.28	5.63	74.2	70.2	309.0	.26	.25	1.08	13.63
4	.81	.77	.59	5.05	4.80	3.69	265.7	252.7	194.0	3.08	2.93	2.25	8.62
5	.14	.13	.10	1.82	1.73	1.30	187.9	179.0	134.2	1.63	1.55	1.16	5.83
6	.19	.18	.35	1.70	1.63	3.09	106.0	101.7	192.7	.66	.63	1.20	8.53
7	.17	.16	.40	1.55	1.48	3.69	87.9	83.7	209.3	.51	.49	1.21	9.28
8	.19	.18	.26	1.74	1.63	2.42	125.7	117.7	174.6	.78	.73	1.08	7.61
EIGHT BAG TOTAL	3.15			16.77			1071.0			7.69			
505 SEC BAG MASS	3.09			16.64			1010.9			6.79			
PERCENT DIFFERENCE	-1.94			-.78			-5.95			-13.25			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-10. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 2 HR SOAK

1976 Honda Civic CVCC

TEST NO. 19

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.46	1.38	4.17	2.09	1.97	5.97	126.2	119.0	360.5	.57	.54	1.63	16.17
2	.31	.29	.43	1.40	1.33	1.94	131.6	125.1	182.7	.45	.43	.63	7.94
3	.60	.58	2.50	2.82	2.72	11.75	72.7	70.0	302.9	.32	.31	1.33	13.98
4	.84	.79	.61	3.57	3.35	2.61	275.6	258.8	201.1	2.92	2.74	2.13	8.86
5	.11	.10	.08	1.73	1.64	1.24	191.7	181.7	136.9	1.60	1.52	1.14	5.94
6	.20	.19	.36	2.07	1.99	3.76	101.2	97.2	184.0	.62	.60	1.13	8.20
7	.16	.15	.38	1.67	1.61	3.98	81.3	78.4	193.5	.46	.44	1.10	8.61
8	.20	.19	.28	1.86	1.73	2.58	130.0	121.1	180.6	.83	.77	1.15	7.88
EIGHT BAG TOTAL	3.88			17.21			1110.2			7.77			
505 SEC BAG MASS	3.73			17.31			1104.8			6.92			
PERCENT DIFFERENCE	-4.02			.58			-.49			-12.28			

TEST NO. 28

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.14	1.10	3.26	1.17	1.13	3.34	95.9	92.6	274.1	.54	.52	1.54	12.23
2	.46	.44	.64	1.25	1.18	1.74	121.9	115.6	169.3	.41	.39	.57	7.39
3	.32	.30	1.33	3.23	3.08	13.46	70.9	67.5	295.3	.19	.18	.79	13.62
4	.92	.87	.67	4.43	4.21	3.23	259.3	246.1	189.2	2.70	2.56	1.97	8.40
5	.11	.10	.08	1.75	1.66	1.25	182.3	173.1	130.2	1.46	1.39	1.04	5.65
6	.15	.14	.27	1.60	1.52	2.91	95.4	90.7	173.4	.49	.47	.89	7.68
7	.20	.19	.48	1.95	1.88	4.64	79.2	76.1	188.5	.45	.43	1.07	8.46
8	.19	.18	.26	2.15	2.01	2.99	125.0	116.8	173.6	.83	.78	1.15	7.60
EIGHT BAG TOTAL	3.49			17.53			1029.8			7.07			
505 SEC BAG MASS	3.41			17.74			1032.0			6.49			
PERCENT DIFFERENCE	-2.35			1.18			.21			-8.94			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-11. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 4 HR SOAK

1976 Honda Civic CVCC

TEST NO. 17

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	2.16	2.09	6.17	2.35	2.26	6.71	134.8	129.8	385.1	.66	.64	1.89	17.53
2	.59	.56	.82	1.99	1.92	2.07	128.4	122.2	178.3	.75	.71	1.04	7.82
3	.78	.75	3.25	5.96	5.71	24.83	73.6	70.6	306.8	.25	.24	1.04	15.12
4	1.07	.99	.78	5.80	5.38	4.23	283.8	263.2	207.1	2.88	2.67	2.10	9.25
5	.06	.06	.04	1.62	1.57	1.16	189.1	183.0	135.0	1.44	1.39	1.03	5.85
6	.18	.17	.33	2.52	2.37	4.58	99.1	93.0	180.2	.53	.50	.96	8.09
7	.13	.12	.31	1.63	1.56	3.88	83.7	80.1	199.2	.41	.39	.98	8.84
8	.29	.27	.40	2.69	2.51	3.74	125.2	116.8	173.8	.83	.77	1.15	7.68
EIGHT BAG TOTAL	5.26			24.06			1117.5			7.75			
505 SEC BAG MASS	5.16			24.12			1109.9			7.09			
PERCENT DIFFERENCE	-1.94			.25			-.69			-9.31			

TEST NO. 18

BAG NO.	HC G/ TEST	HC G/ MIN.	HC G/ KM	CO G/ TEST	CO G/ MIN.	CO G/ KM	CO2 G/ TEST	CO2 G/ MIN.	CO2 G/ KM	NOX G/ TEST	NOX G/ MIN.	NOX G/ KM	FUEL CONS. L/ 100KM
1	1.17	1.12	3.34	1.54	1.47	4.40	132.7	127.0	379.1	.62	.59	1.77	16.74
2	.45	.43	.63	1.44	1.37	2.00	134.2	127.8	186.4	.51	.49	.71	8.13
3	.57	.54	2.37	4.95	4.67	20.62	74.1	69.9	308.7	.20	.19	.83	14.80
4	1.12	1.06	.82	5.85	5.53	4.27	272.2	257.2	198.7	2.71	2.56	1.98	8.89
5	.10	.09	.07	1.66	1.57	1.19	190.9	180.7	136.4	1.44	1.36	1.03	5.91
6	.22	.21	.40	2.27	2.16	4.13	102.3	97.3	186.1	.55	.52	1.00	8.32
7	.17	.16	.40	1.81	1.74	4.31	85.3	82.1	203.0	.43	.41	1.02	9.04
8	.19	.18	.26	1.87	1.76	2.60	126.6	119.1	175.9	.74	.70	1.03	7.68
EIGHT BAG TOTAL	3.99			21.39			1118.3			7.20			
505 SEC BAG MASS	3.78			21.22			1076.2			6.77			
PERCENT DIFFERENCE	-5.56			-.80			-3.91			-6.35			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-12. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 8 HR SOAK

1976 Honda Civic CVCC

TEST NO. 15

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.02	2.84	8.63	2.69	2.57	7.69	151.6	145.0	433.0	.73	.70	2.09	19.94
2	.88	.82	1.22	2.08	1.95	2.89	140.8	132.0	195.5	.94	.88	1.31	8.66
3	.57	.54	2.37	5.24	4.93	21.03	82.1	77.2	342.0	.25	.24	1.04	16.29
4	1.16	1.11	.85	4.99	4.78	3.64	271.9	260.6	190.4	2.55	2.44	1.86	8.85
5	.10	.10	.07	1.83	1.74	1.31	194.5	184.9	130.9	1.61	1.53	1.15	6.03
6	.19	.18	.35	2.14	2.03	3.89	102.4	97.0	186.1	.54	.51	.98	8.30
7	.16	.15	.38	1.85	1.79	4.40	86.8	84.0	206.7	.55	.53	1.31	9.21
8	.33	.31	.46	2.64	2.46	3.67	127.9	119.2	177.7	.87	.81	1.21	7.85
EIGHT BAG TOTAL	6.41			23.46			1157.8			8.04			
505 SEC BAG MASS	6.09			23.17			1135.0			7.62			
PERCENT DIFFERENCE	-5.25			-1.25			-2.02			-5.51			

TEST NO. 16

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	3.81	3.71	10.89	4.46	4.34	12.74	172.5	168.0	492.9	.74	.72	2.11	23.11
2	.80	.77	1.11	2.59	2.49	3.60	173.5	166.6	241.0	.94	.90	1.31	10.62
3	1.45	1.37	6.04	7.93	7.48	33.04	84.2	79.4	350.8	.36	.34	1.50	17.91
4	1.89	1.81	1.30	9.39	8.97	6.85	314.4	300.4	229.5	2.91	2.78	2.12	10.46
5	.08	.08	.06	1.72	1.62	1.23	209.8	197.3	199.9	1.21	1.14	.86	6.99
6	.22	.21	.40	2.46	2.35	4.47	108.7	103.8	197.6	.49	.47	.89	8.84
7	.17	.16	.40	1.76	1.70	4.19	91.0	87.8	216.7	.39	.38	.93	9.62
8	.31	.29	.43	2.75	2.55	3.82	131.7	122.1	182.9	.65	.60	.90	8.08
EIGHT BAG TOTAL	8.73			33.06			1285.8			7.69			
505 SEC BAG MASS	8.47			32.92			1273.3			8.46			
PERCENT DIFFERENCE	-3.07			-.43			-.98			9.10			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-13. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 16 HR SOAK

1976 Honda Civic CVCC

TEST NO. 11

BAG NO.	HC G/TEST	HC G/MIN.	HC G/KM	CO G/TEST	CO G/MIN.	CO G/KM	CO2 G/TEST	CO2 G/MIN.	CO2 G/KM	NOX G/TEST	NOX G/MIN.	NOX G/KM	FUEL CONS. L/100KM
1	5.39	5.13	15.40	6.07	5.78	17.34	152.5	145.2	435.6	.67	.64	1.91	21.60
2	1.01	.96	1.40	2.61	2.49	3.63	123.4	117.5	171.4	.77	.73	1.07	7.71
3	1.47	1.39	6.12	7.22	6.83	30.08	67.4	64.3	283.0	.25	.24	1.04	19.85
4	1.42	1.34	1.04	4.39	4.13	3.20	256.3	241.0	187.1	2.63	2.47	1.92	8.36
5	.05	.05	.04	1.45	1.39	1.04	176.1	169.3	125.8	1.22	1.17	.87	5.45
6	.21	.20	.38	2.81	2.68	5.11	107.4	102.4	195.2	.58	.55	1.05	8.77
7	.11	.11	.26	1.91	1.84	4.55	81.7	78.6	194.4	.37	.36	.88	8.68
8	.17	.16	.24	2.00	1.87	2.78	112.9	105.6	156.7	.65	.61	.90	6.87
EIGHT BAG TOTAL	9.83			28.46			1078.0			7.14			
505 SEC BAG MASS	9.44			28.90			1137.7			6.94			
PERCENT DIFFERENCE	-4.13			1.52			5.24			-2.88			

TEST NO. 29

BAG NO.	HC G/TEST	HC G/MIN.	HC G/KM	CO G/TEST	CO G/MIN.	CO G/KM	CO2 G/TEST	CO2 G/MIN.	CO2 G/KM	NOX G/TEST	NOX G/MIN.	NOX G/KM	FUEL CONS. L/100KM
1	3.69	3.41	10.90	5.31	4.98	15.17	157.1	147.2	448.7	.62	.58	1.77	21.34
2	.85	.82	1.18	2.44	2.34	3.39	134.7	129.3	187.1	.87	.84	1.21	8.33
3	1.04	1.04	4.54	7.13	6.79	29.71	74.5	70.9	310.4	.24	.23	1.00	15.77
4	1.47	1.39	1.07	5.11	4.84	3.73	278.1	263.2	203.0	2.90	2.74	2.12	9.08
5	.06	.06	.04	1.66	1.57	1.19	189.4	178.7	135.3	1.46	1.38	1.04	5.86
6	.17	.16	.31	2.34	2.25	4.25	107.1	102.8	194.7	.57	.55	1.04	8.69
7	.23	.22	.55	2.27	2.18	5.90	87.4	83.7	208.0	.51	.49	1.21	9.35
8	.16	.15	.22	1.99	1.85	2.76	128.4	119.2	170.3	.80	.74	1.11	7.78
EIGHT BAG TOTAL	7.67			28.25			1156.6			7.97			
505 SEC BAG MASS	7.15			27.34			1112.8			7.21			
PERCENT DIFFERENCE	-7.27			-3.33			-3.94			-10.54			

TEST NO. 31

BAG NO.	HC G/TEST	HC G/MIN.	HC G/KM	CO G/TEST	CO G/MIN.	CO G/KM	CO2 G/TEST	CO2 G/MIN.	CO2 G/KM	NOX G/TEST	NOX G/MIN.	NOX G/KM	FUEL CONS. L/100KM
1	4.25	4.05	12.14	5.02	4.79	14.34	147.4	140.6	421.1	.75	.72	2.14	20.35
2	.91	.87	1.26	2.98	2.83	4.14	135.6	128.9	188.3	.94	.89	1.31	8.44
3	1.21	1.14	5.04	7.30	6.90	30.42	76.8	72.5	319.8	.31	.29	1.29	16.29
4	1.53	1.46	1.12	7.10	6.76	5.18	278.4	265.1	203.2	2.83	2.70	2.07	9.19
5	.09	.08	.06	1.72	1.62	1.23	198.3	186.5	141.6	1.57	1.48	1.12	6.14
6	.20	.19	.36	2.22	2.15	4.04	99.1	96.1	180.3	.59	.57	1.07	8.06
7	.27	.26	.64	2.42	2.30	5.76	89.8	85.2	213.7	.60	.57	1.43	9.64
8	.38	.36	.53	3.08	2.90	4.28	134.3	126.5	186.5	1.05	.99	1.46	8.27
EIGHT BAG TOTAL	8.84			31.84			1159.6			8.64			
505 SEC BAG MASS	7.97			28.91			1102.3			7.88			
PERCENT DIFFERENCE	-10.92			-10.13			-5.20			-9.64			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-14. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS FOLLOWING 36 HR SOAK

1976 Honda Civic CVCC

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TEST NO. 13

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	5.00	4.84	14.29	9.53	9.22	27.23	144.6	140.0	413.2	.69	.67	1.97	21.16
2	1.07	1.02	1.49	3.26	3.11	4.53	143.9	137.5	199.9	1.08	1.03	1.50	8.99
3	2.14	2.03	8.92	8.07	7.66	33.62	73.3	69.6	305.3	.33	.31	1.37	16.91
4	1.76	1.66	1.28	7.87	7.41	5.74	288.4	271.6	210.5	2.99	2.82	2.18	9.56
5	.03	.03	.02	1.64	1.55	1.17	200.6	189.8	143.3	1.57	1.49	1.12	6.20
6	.11	.11	.20	1.98	1.91	3.60	110.2	106.3	200.3	.61	.59	1.11	8.87
7	.13	.12	.31	1.98	1.90	4.71	84.5	81.1	201.1	.43	.41	1.02	8.98
8	.26	.24	.36	2.89	2.67	4.01	141.6	130.9	196.7	1.00	.92	1.39	8.67
EIGHT BAG TOTAL	10.50			37.22			1187.1			8.70			
505 SEC BAG MASS	10.44			36.62			1257.9			8.14			
PERCENT DIFFERENCE	-.57			-1.64			5.63			-6.88			

TEST NO. 14

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	4.61	4.40	13.17	4.65	4.44	13.29	146.7	140.2	419.3	.78	.75	2.23	20.34
2	.84	.80	1.17	2.71	2.59	3.76	139.7	133.6	194.0	1.08	1.03	1.50	8.64
3	1.24	1.17	5.17	7.16	6.75	29.83	73.4	69.3	305.9	.30	.28	1.25	15.68
4	1.48	1.40	1.08	7.76	7.34	5.66	285.5	270.2	208.4	3.05	2.89	2.23	9.44
5	.04	.04	.03	1.69	1.61	1.21	198.9	189.4	142.0	1.62	1.54	1.16	6.15
6	.17	.16	.31	2.49	2.38	4.53	108.3	103.3	197.0	.70	.67	1.27	8.80
7	.14	.13	.33	2.21	2.10	5.26	85.4	81.2	203.4	.52	.49	1.24	9.12
8	.30	.28	.42	2.80	2.64	3.89	146.2	137.7	203.0	1.06	1.00	1.47	8.93
EIGHT BAG TOTAL	8.82			31.47			1184.1			9.11			
505 SEC BAG MASS	8.57			31.39			1210.8			8.58			
PERCENT DIFFERENCE	-2.92			-.25			2.20			-6.18			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-15. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 10 MINUTE SOAK

1976 Honda Civic CVCC

TEST NO. 9

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.02	.98	1.70	2.94	2.83	4.90	161.0	154.8	268.4	.84	.81	1.40	12.11
2	.35	.33	.95	2.61	2.50	7.05	102.2	97.8	276.4	.93	.89	2.51	12.40
3	.13	.12	.20	1.40	1.33	2.12	106.3	100.7	161.0	.55	.52	.83	7.05
4	.13	.12	.33	1.42	1.35	3.64	91.3	86.5	234.1	.32	.30	.82	10.38
5	.13	.12	.45	1.35	1.28	4.66	70.0	66.5	241.4	.23	.22	.74	10.70
6	.17	.16	.44	1.41	1.35	3.62	93.9	89.7	240.7	.37	.35	.95	10.68
7	.14	.13	.33	1.29	1.23	3.00	96.5	92.1	224.4	.47	.45	1.09	9.73
8	.07	.07	.13	.95	.88	1.70	69.1	64.2	123.5	.24	.22	.43	5.37
EIGHT BAG TOTAL	2.14			13.37			790.4			3.95			
505 SEC BAG MASS	2.21			14.22			824.4			4.19			
PERCENT DIFFERENCE	3.17			5.98			4.13			5.73			

TEST NO. 10

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	1.67	1.60	2.78	3.21	3.07	5.35	131.0	125.3	218.3	.67	.64	1.12	10.13
2	.44	.42	1.19	2.49	2.37	6.73	103.0	97.9	278.4	.76	.72	2.05	12.49
3	.16	.15	.24	1.48	1.40	2.24	109.2	103.3	165.5	.53	.50	.80	7.25
4	.15	.14	.38	1.35	1.30	3.46	86.9	83.6	222.9	.30	.29	.77	9.90
5	.17	.16	.59	1.36	1.28	4.69	70.1	66.0	241.7	.24	.23	.83	10.73
6	.19	.19	.49	1.36	1.29	3.49	90.7	86.1	232.6	.34	.32	.87	10.33
7	.15	.14	.35	1.21	1.15	2.81	94.1	89.3	218.7	.46	.44	1.07	9.48
8	.10	.09	.18	1.00	.94	1.79	71.5	67.1	127.7	.23	.22	.41	5.56
EIGHT BAG TOTAL	3.03			13.46			756.4			3.53			
505 SEC BAG MASS	2.99			14.24			980.4			3.80			
PERCENT DIFFERENCE	-1.34			5.48			22.85			7.11			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

TABLE E-16. MASS EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF MUDDS FOLLOWING 16 HR SOAK
1976 Honda Civic CVCC

TEST NO. 6

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	5.50	5.32	9.17	7.58	7.34	12.63	151.3	146.4	252.1	1.25	1.21	2.08	12.95
2	6.06	5.76	16.38	10.42	9.91	28.16	113.0	107.4	305.4	1.18	1.12	3.19	17.14
3	.81	.76	1.23	4.71	4.41	7.19	130.9	122.6	198.4	.80	.75	1.21	9.12
4	.28	.27	.72	2.95	2.83	7.56	105.2	101.0	269.8	.28	.27	.72	12.24
5	.23	.22	.79	2.60	2.47	8.97	80.1	76.0	276.0	.22	.21	.76	12.51
6	.23	.22	.59	2.02	1.91	5.18	103.2	97.8	264.6	.30	.28	.77	11.84
7	.17	.16	.40	1.53	1.46	3.56	104.3	99.8	242.5	.32	.31	.74	10.53
8	.11	.10	.20	1.22	1.14	2.18	101.7	94.9	181.6	.28	.26	.50	7.88
EIGHT BAG TOTAL	13.39			33.03			889.6			4.63			
505 SEC BAG MASS	12.76			32.42			868.0			4.61			
PERCENT DIFFERENCE	-4.94			-1.88			-2.49			-.43			

TEST NO. 7

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	6.33	6.07	10.55	8.85	8.48	14.75	158.9	152.3	264.7	1.37	1.31	2.28	13.83
2	3.59	3.49	9.70	8.93	8.67	24.14	117.0	113.6	316.2	1.29	1.25	3.49	16.43
3	.68	.63	1.03	4.25	3.92	6.44	139.1	128.2	210.7	.72	.66	1.09	9.57
4	.23	.22	.59	2.50	2.43	6.41	104.9	101.8	268.9	.26	.25	.67	12.11
5	.18	.17	.62	2.13	2.01	7.34	79.0	74.6	272.3	.19	.18	.66	12.22
6	.20	.19	.51	1.82	1.74	4.67	99.6	95.3	255.3	.30	.29	.77	11.39
7	.17	.16	.40	1.79	1.69	4.16	110.4	104.0	256.7	.44	.41	1.02	11.18
8	.11	.11	.20	1.25	1.19	2.23	92.3	88.2	164.9	.28	.27	.50	7.17
EIGHT BAG TOTAL	11.49			31.52			901.0			4.85			
505 SEC BAG MASS	11.79			32.44			935.3			5.15			
PERCENT DIFFERENCE	2.54			2.84			3.66			5.83			

TEST NO. 8

	HC			CO			CO2			NOX			FUEL CONS.
BAG NO.	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	G/ TEST	G/ MIN.	G/ KM	L/ 100KM
1	6.76	6.51	11.27	8.73	8.41	14.55	169.0	162.8	281.7	1.64	1.58	2.73	14.64
2	2.83	2.73	7.65	13.55	13.07	36.62	102.6	99.0	277.3	1.18	1.14	3.19	15.33
3	.66	.62	1.00	3.85	3.59	5.83	132.7	123.9	201.1	.72	.67	1.09	9.12
4	.23	.22	.59	2.64	2.51	6.77	101.2	96.4	259.4	.30	.29	.77	11.73
5	.22	.21	.76	2.45	2.34	8.45	72.8	69.6	251.2	.24	.23	.83	11.41
6	.23	.22	.59	2.13	1.99	5.46	112.2	105.0	287.7	.35	.33	.90	12.85
7	.15	.14	.35	1.54	1.48	3.58	100.4	96.7	233.6	.40	.39	.93	10.15
8	.11	.10	.20	1.27	1.19	2.27	83.3	77.8	148.7	.28	.26	.50	6.49
EIGHT BAG TOTAL	11.19			36.16			874.3			5.11			
505 SEC BAG MASS	11.53			36.34			962.9			5.36			
PERCENT DIFFERENCE	2.95			.50			9.20			4.66			

PERCENT DIFFERENCE = ((505 SEC BAG MASS - EIGHT BAG TOTAL) / 505 SEC BAG MASS) X 100

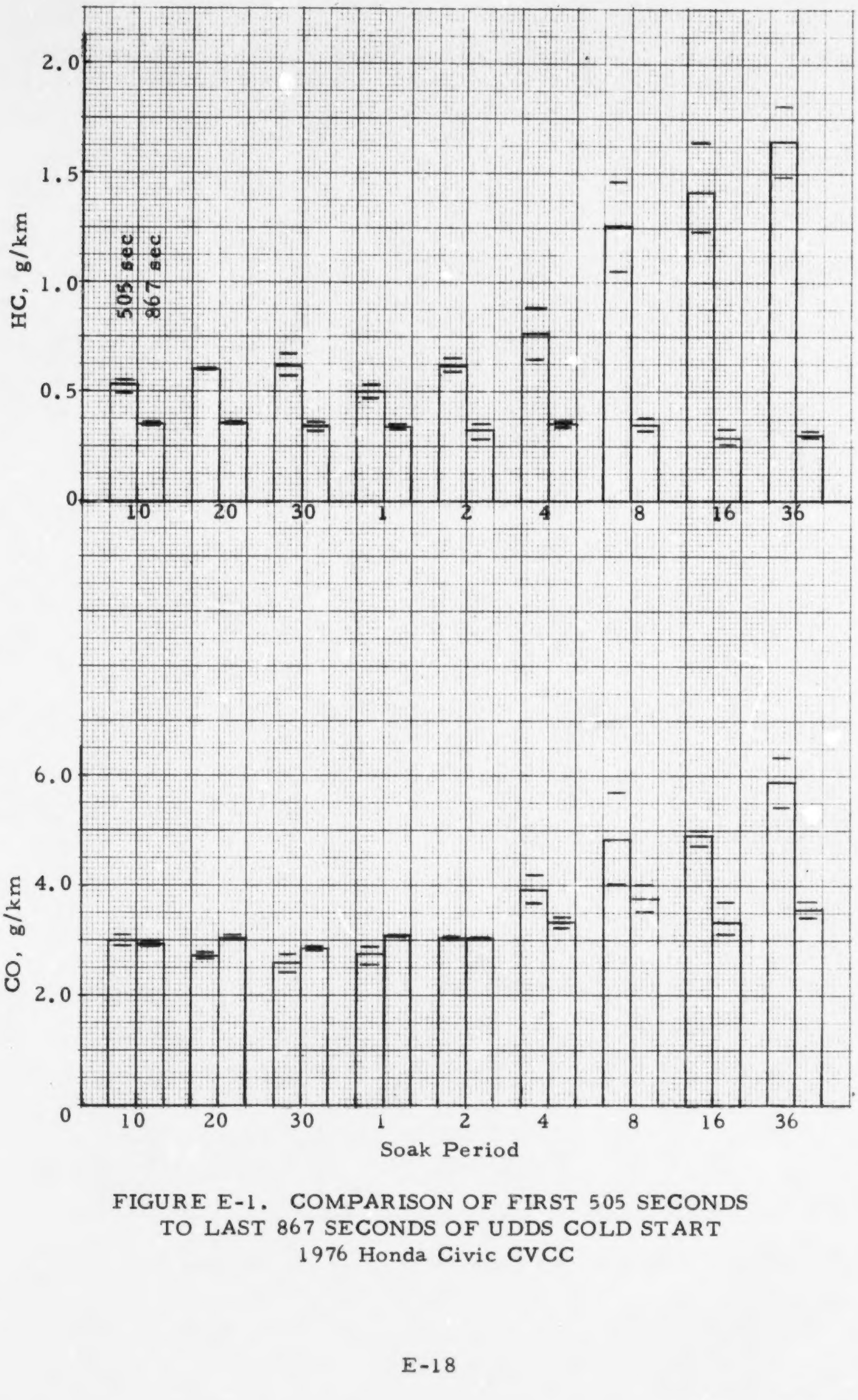

FIGURE E-1. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START
1976 Honda Civic CVCC

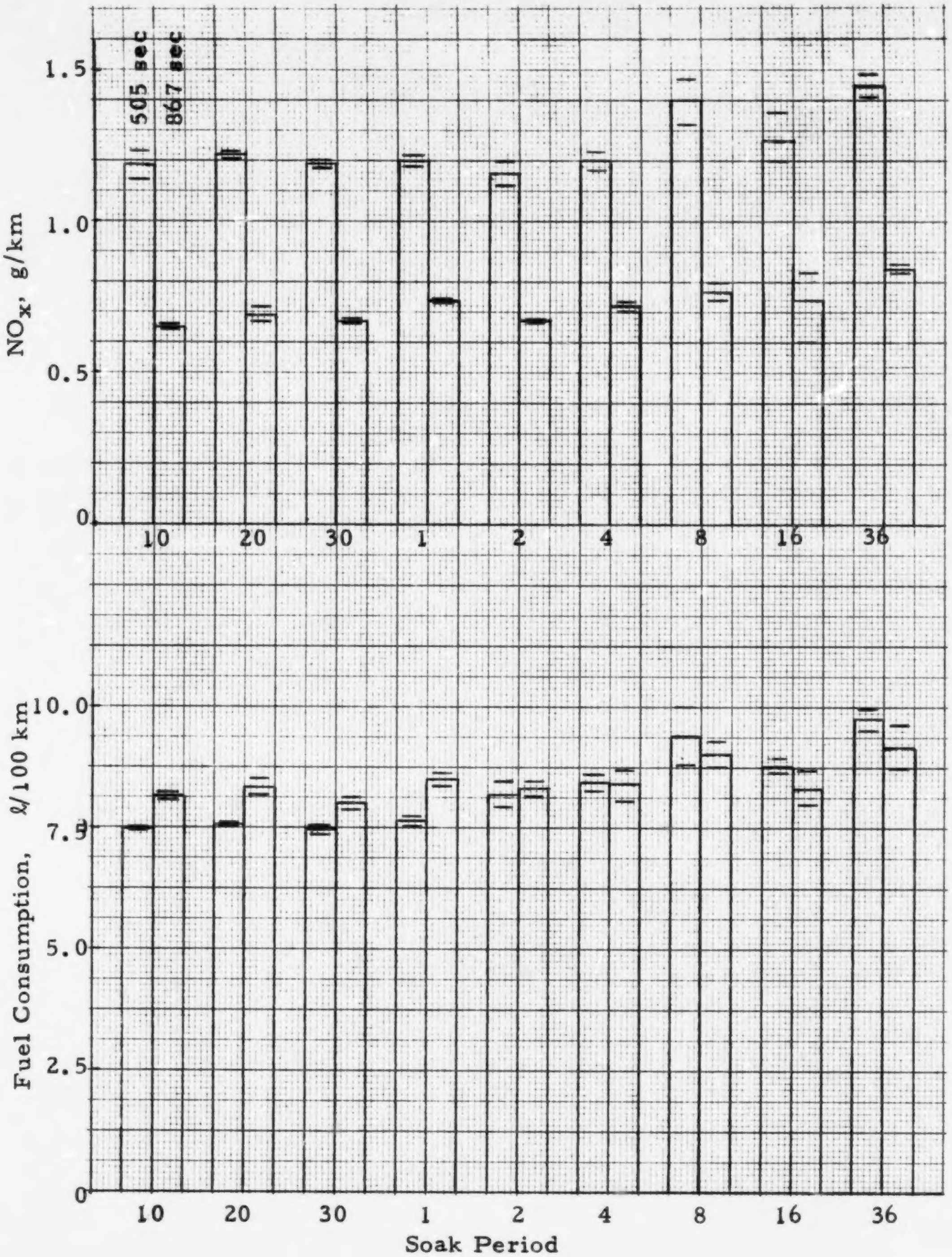

FIGURE E-2. COMPARISON OF FIRST 505 SECONDS TO LAST 867 SECONDS OF UDDS COLD START 1976 Honda Civic CVCC

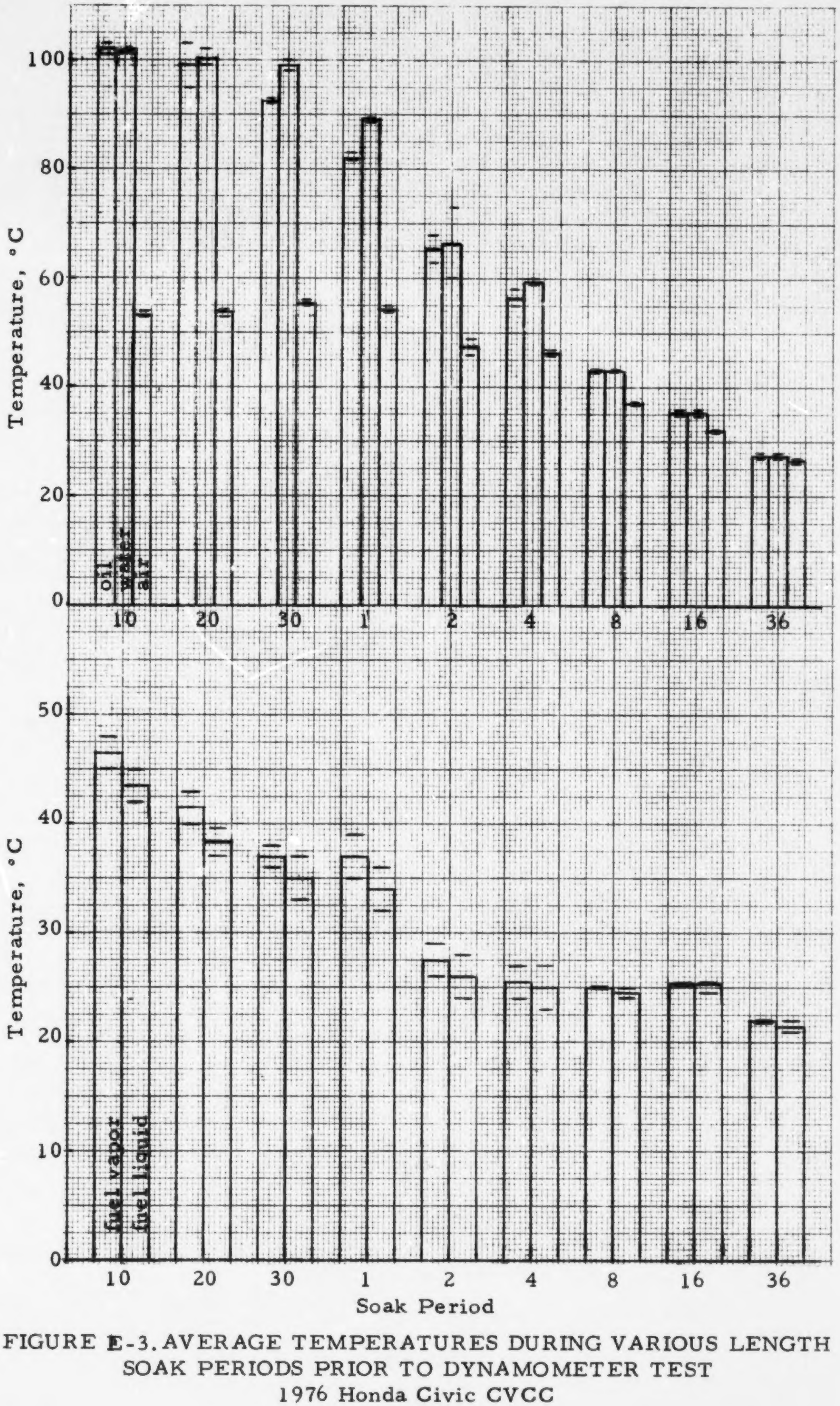

FIGURE E-3. AVERAGE TEMPERATURES DURING VARIOUS LENGTH SOAK PERIODS PRIOR TO DYNAMOMETER TEST
1976 Honda Civic CVCC

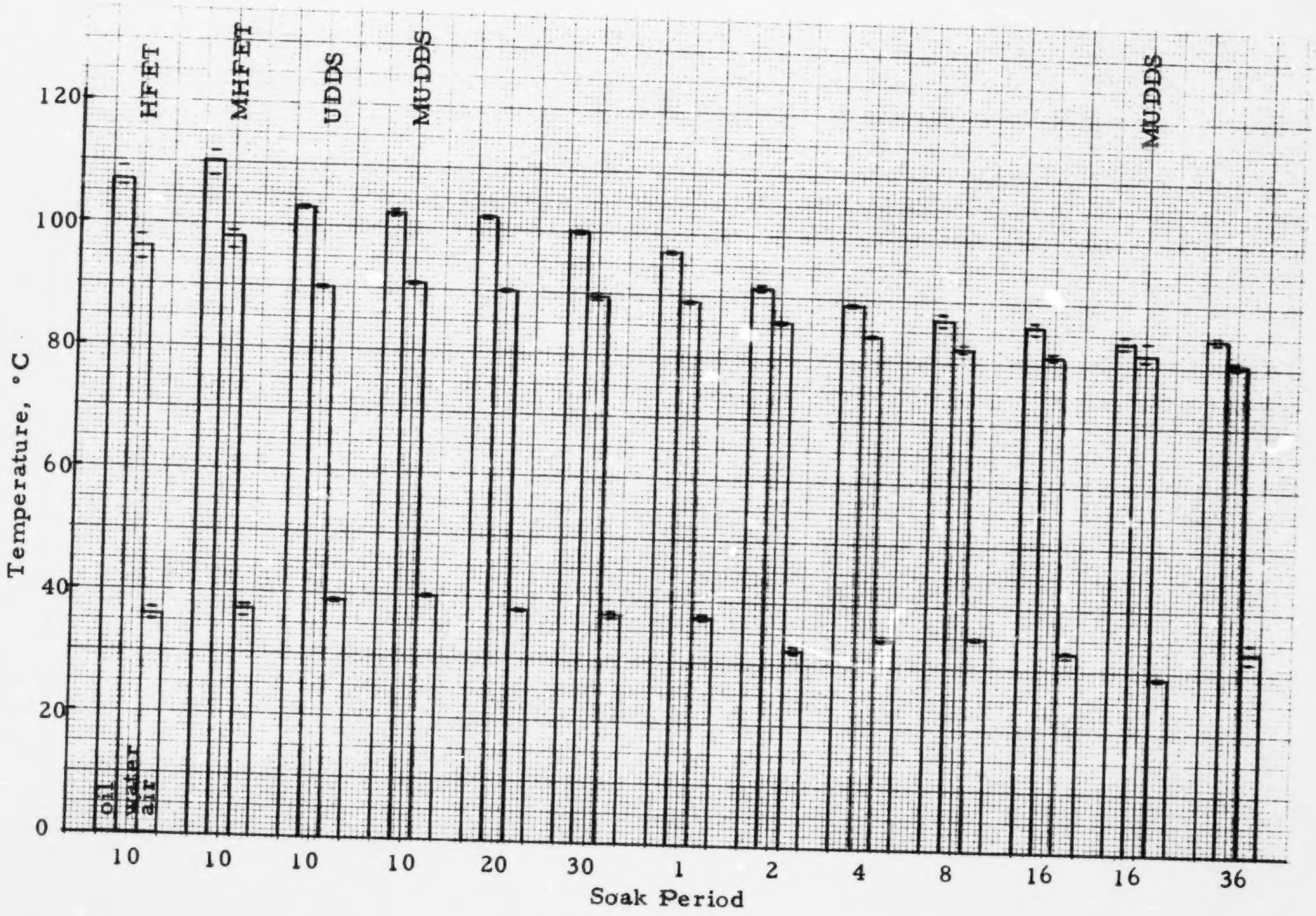

FIGURE E-4. AVERAGE OIL PAN, ENGINE WATER OUT, AND CARBURETOR INLET AIR TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS 1976 Honda Civic CVCC

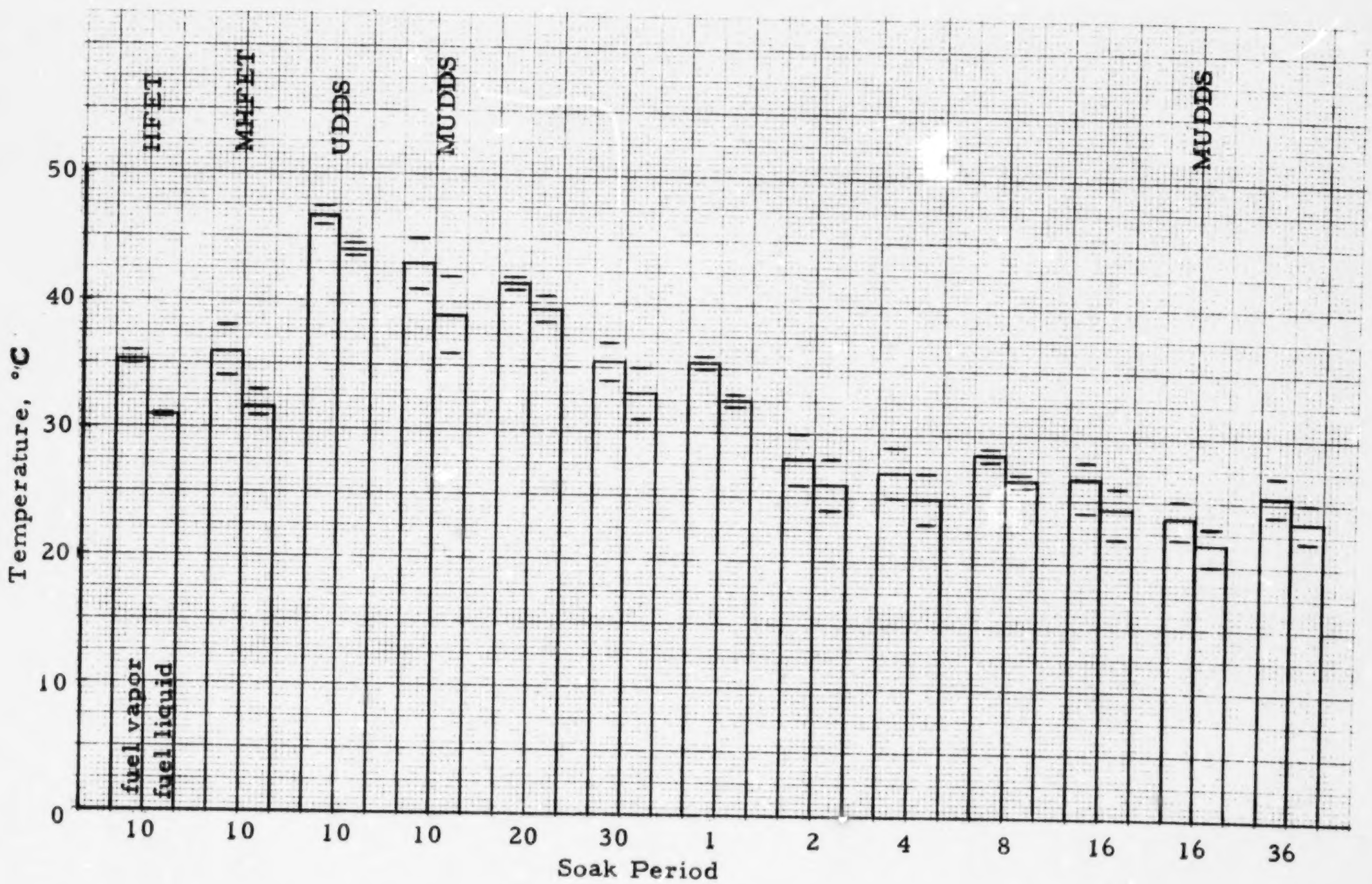

FIGURE E-5. AVERAGE FUEL TANK VAPOR AND FUEL TANK LIQUID TEMPERATURES DURING VARIOUS TRANSIENT CYCLES FOLLOWING SPECIFIC LENGTH SOAK PERIODS
1976 Honda Civic CVCC

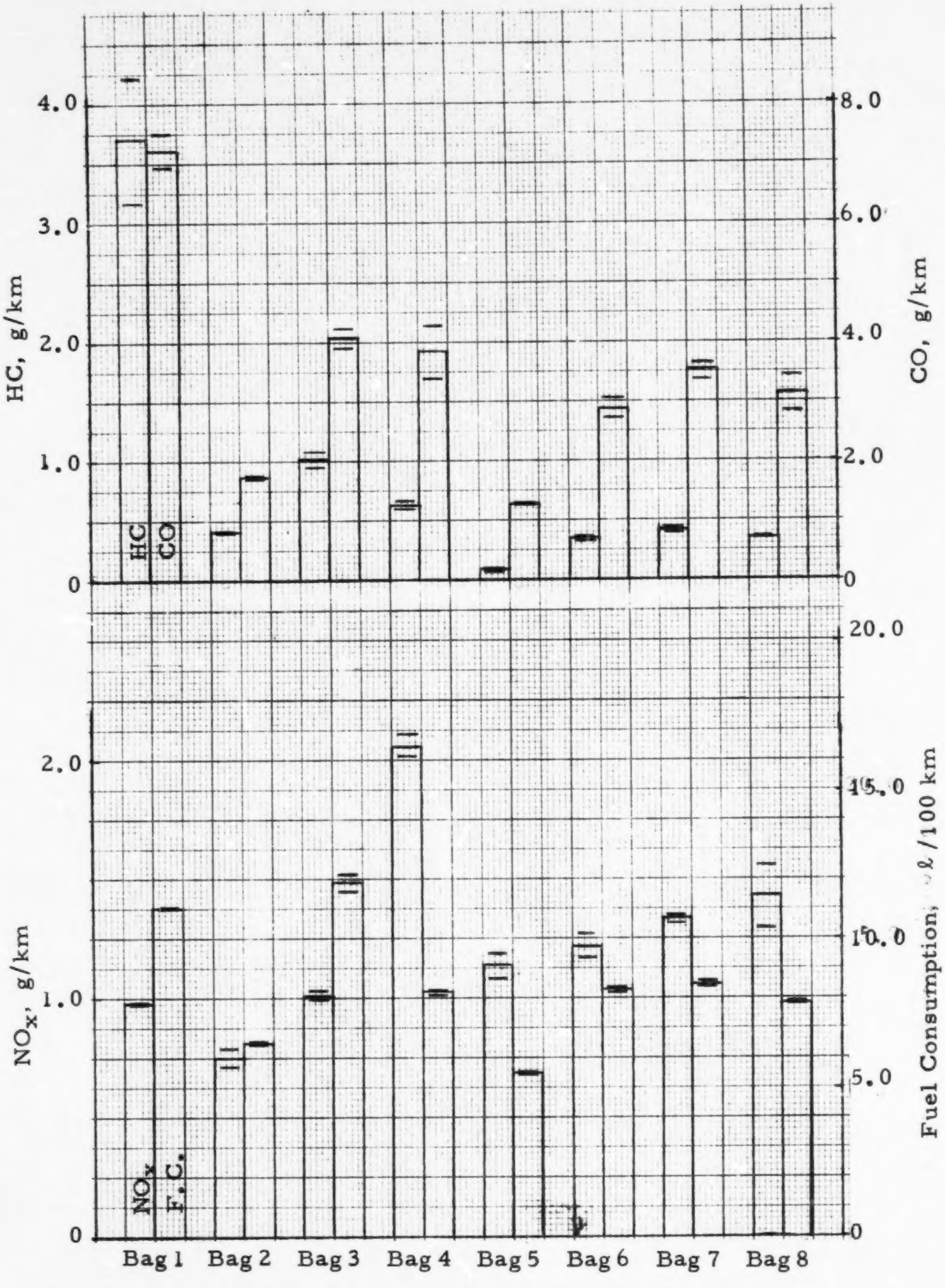

FIGURE E-6. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 10 MINUTE SOAK
1976 Honda Civic CVCC

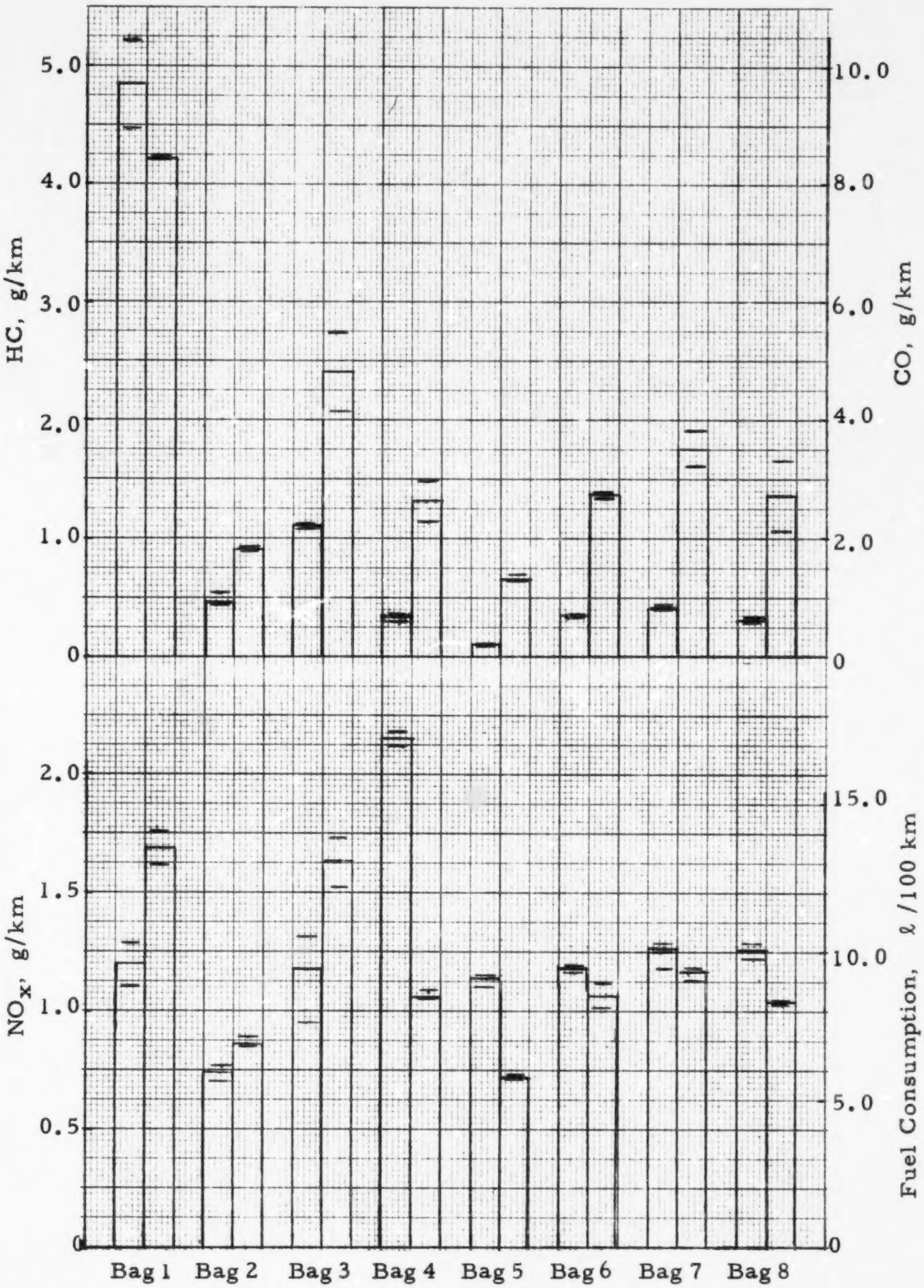

FIGURE E-7. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 20 MINUTE SOAK
1976 Honda Civic CVCC

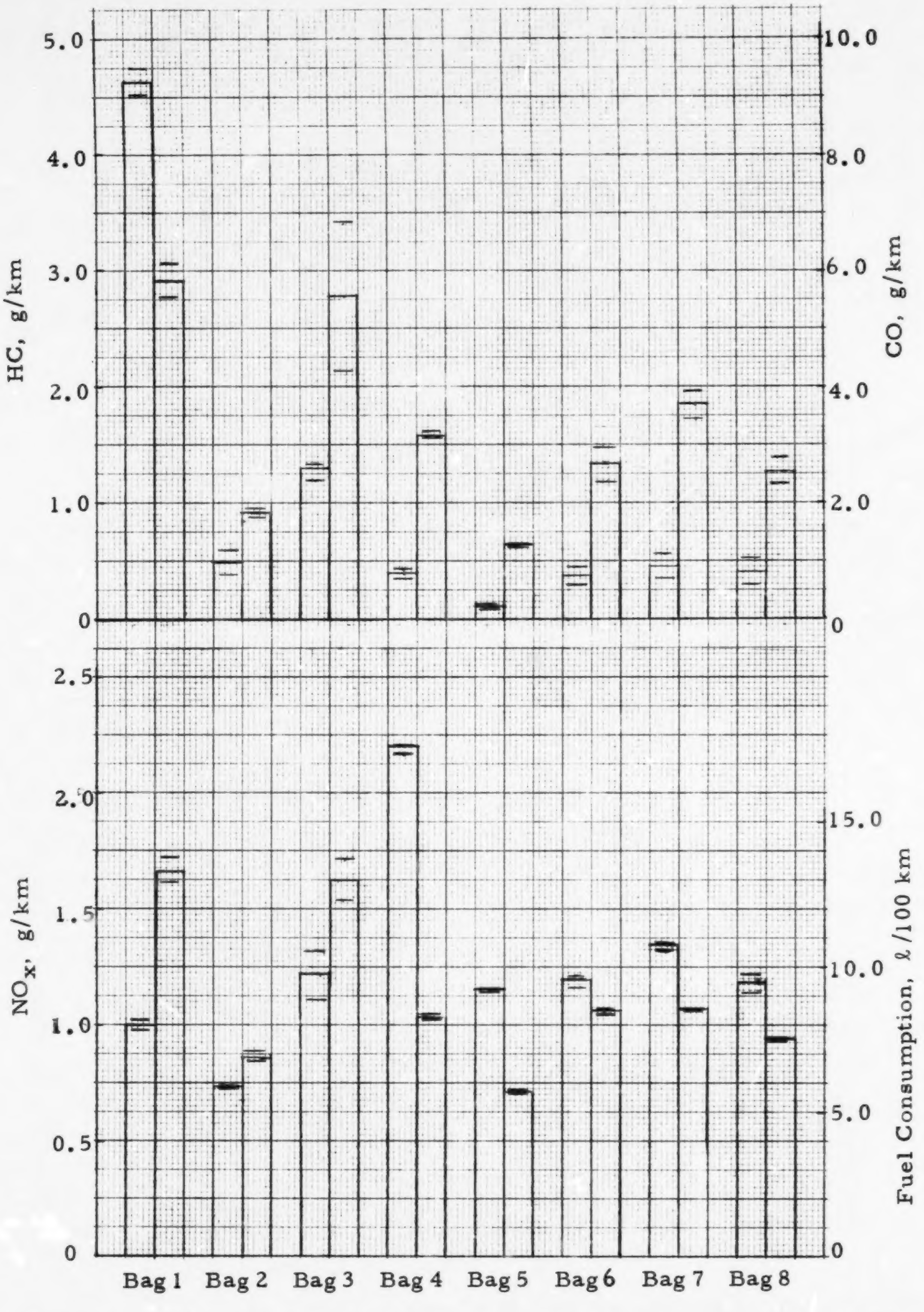

FIGURE E-8. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 30 MINUTE SOAK
1976 Honda Civic CVCC

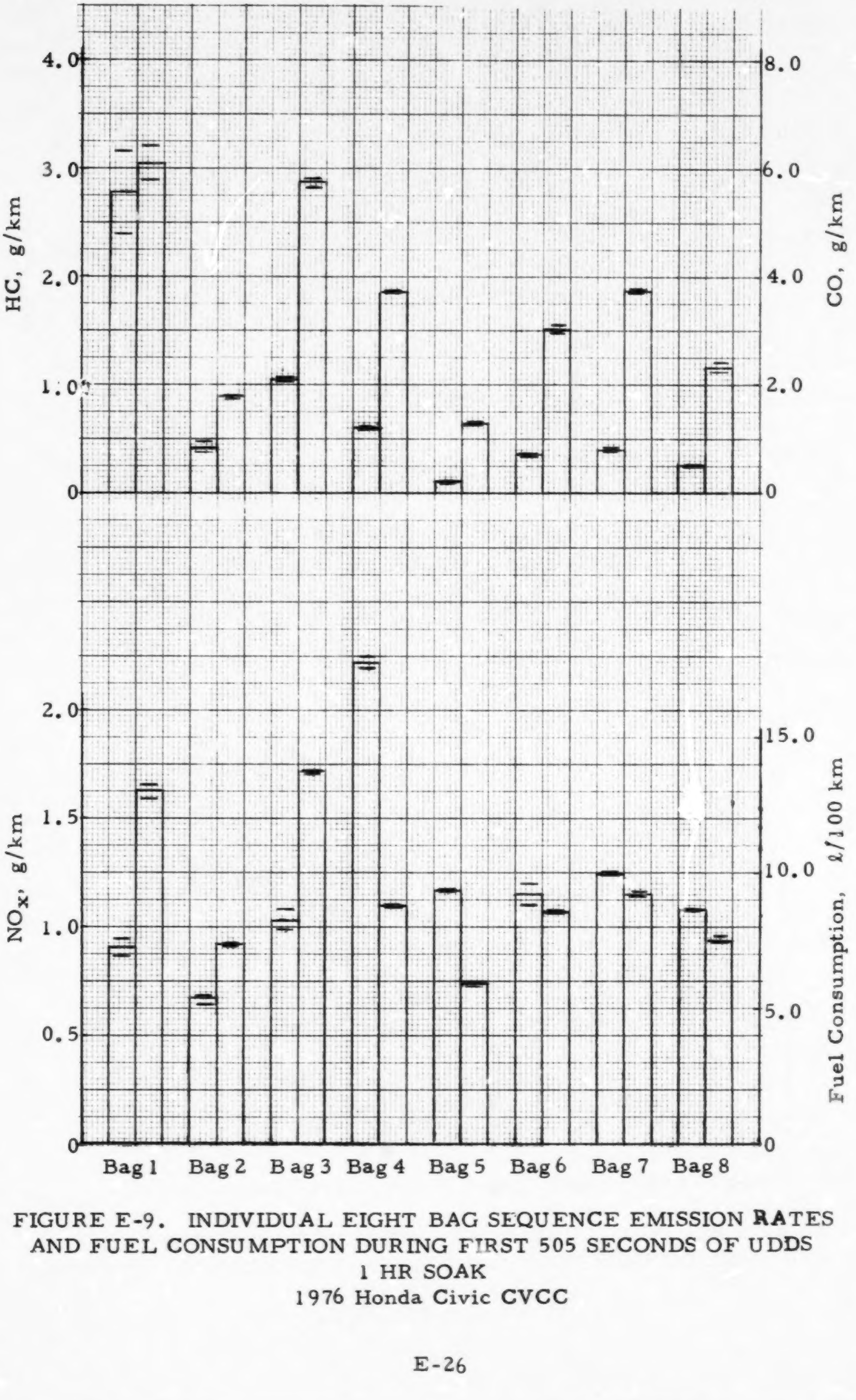

FIGURE E-9. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS
1 HR SOAK
1976 Honda Civic CVCC

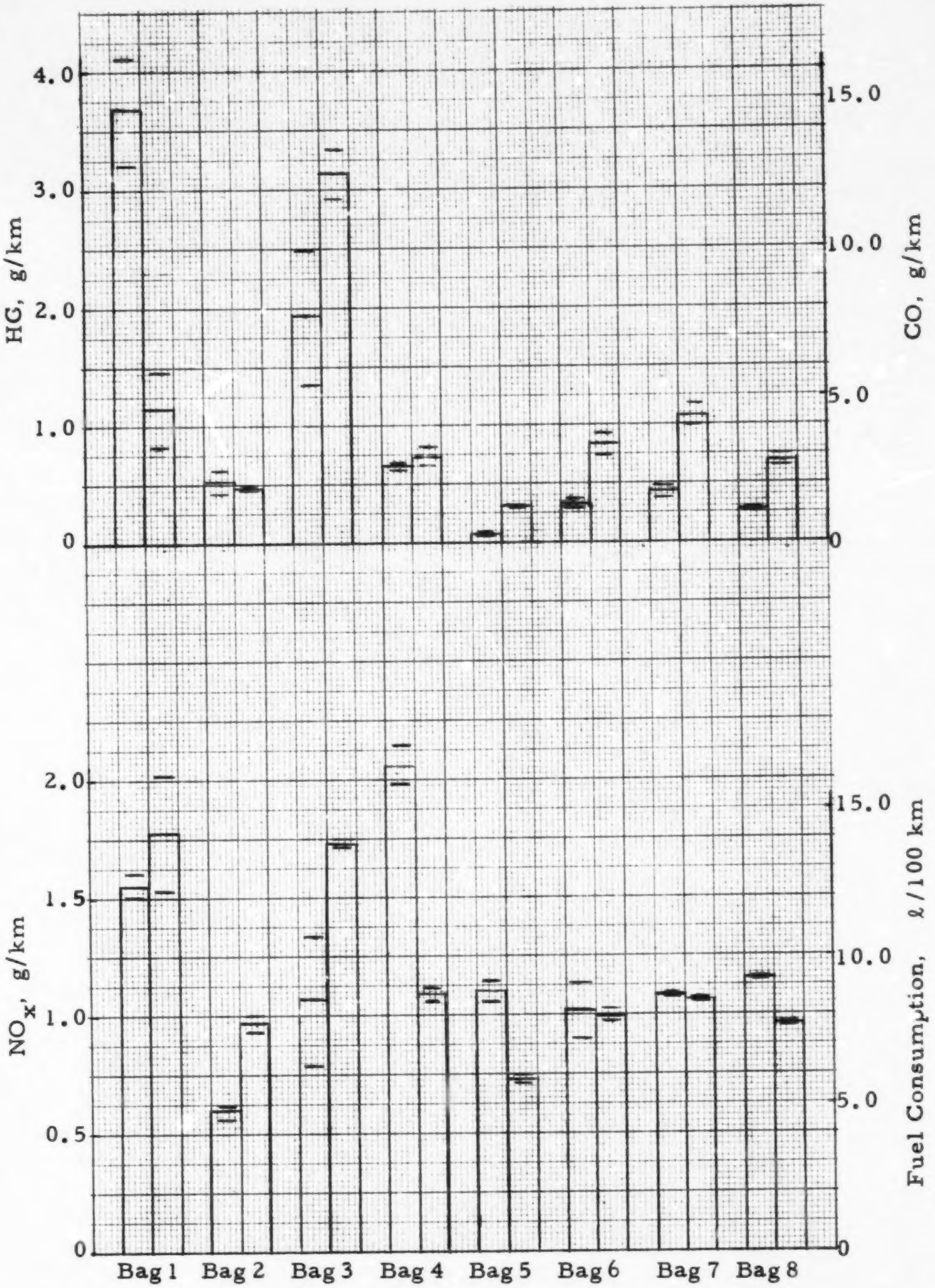

FIGURE E- 10. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 2 HR SOAK
1976 Honda Civic CVCC

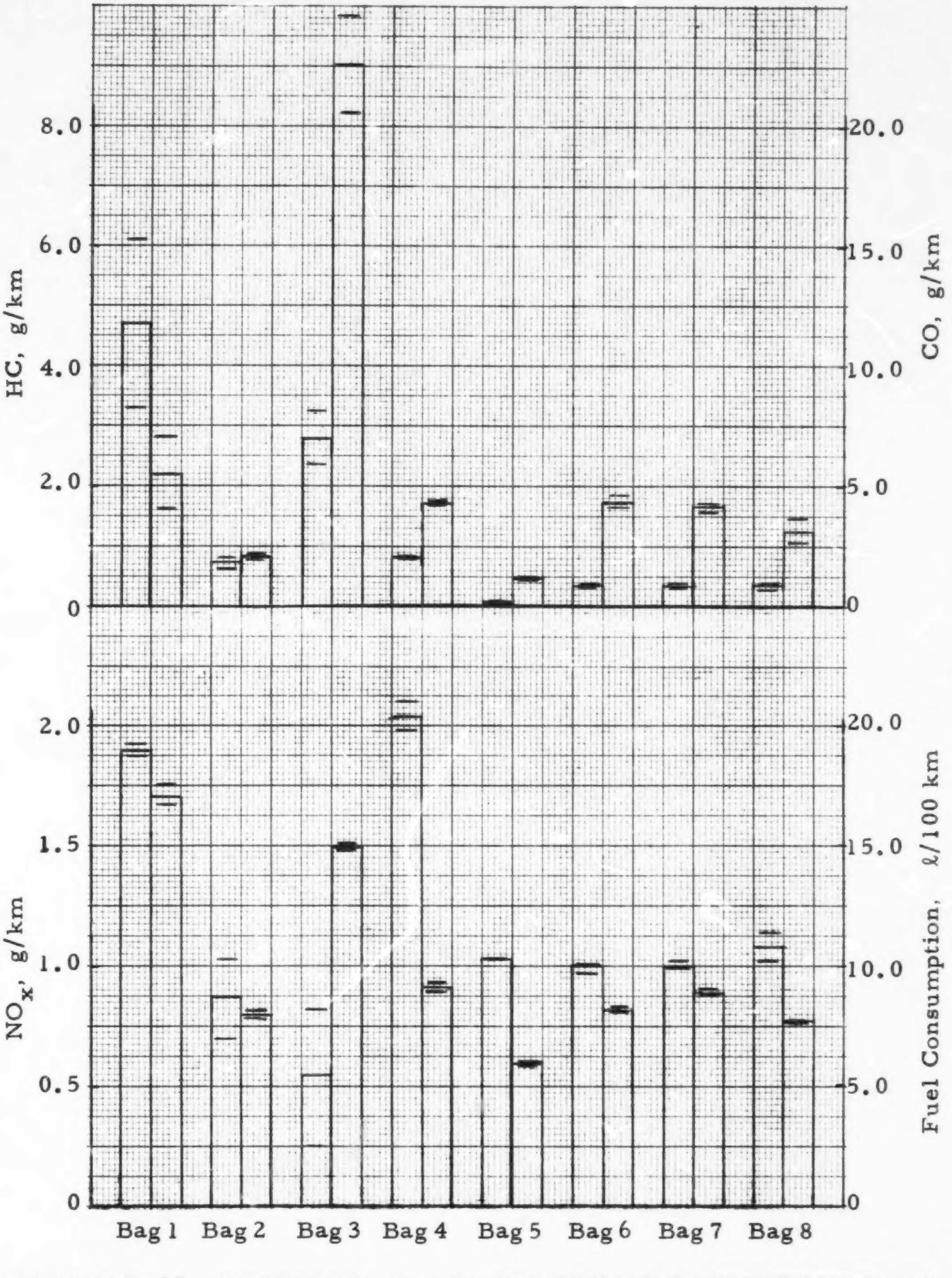

FIGURE E-11. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 4 HR SOAK
1976 Honda Civic CVCC

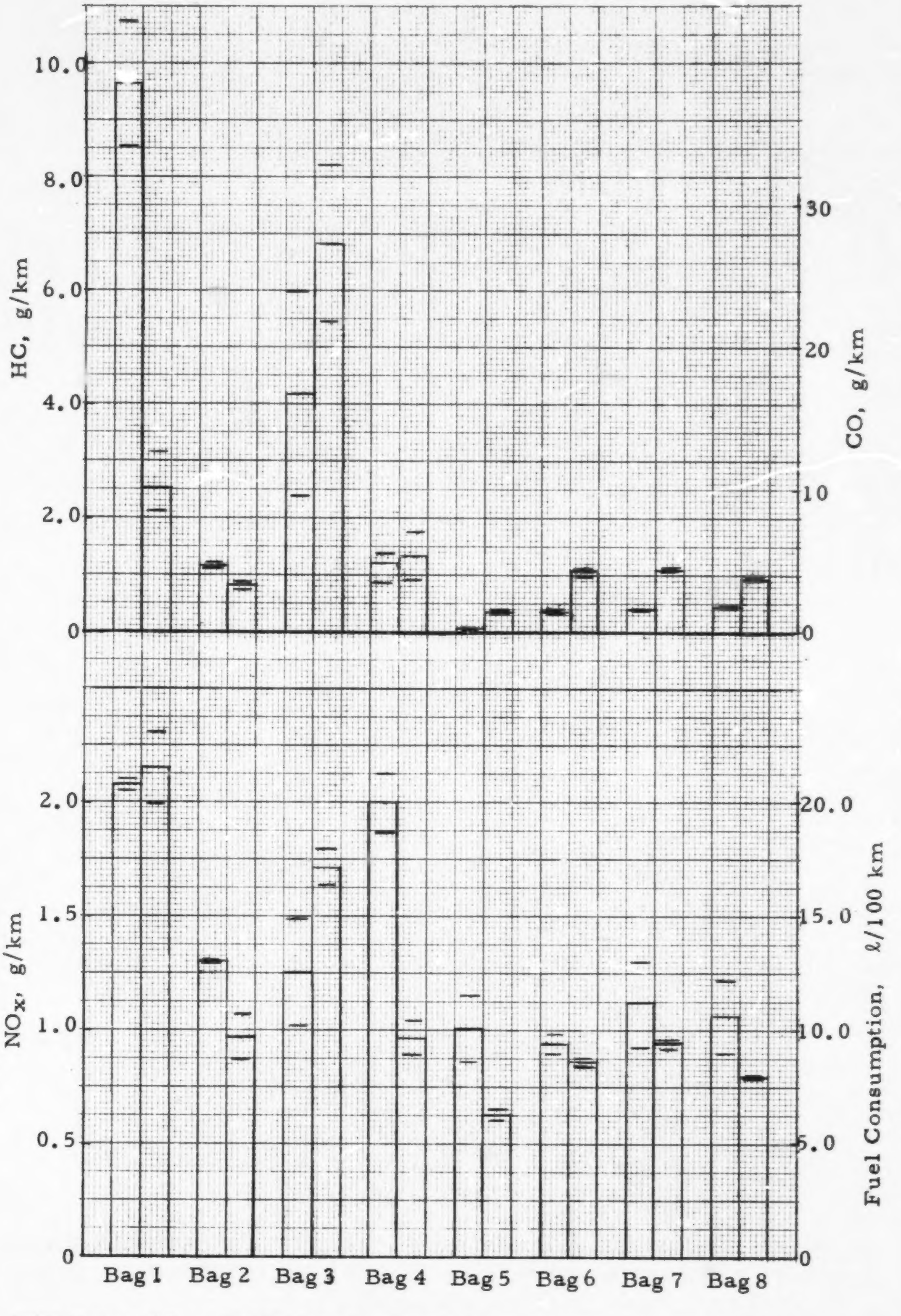

FIGURE E-12. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 8 HR SOAK
1976 Honda Civic CVCC

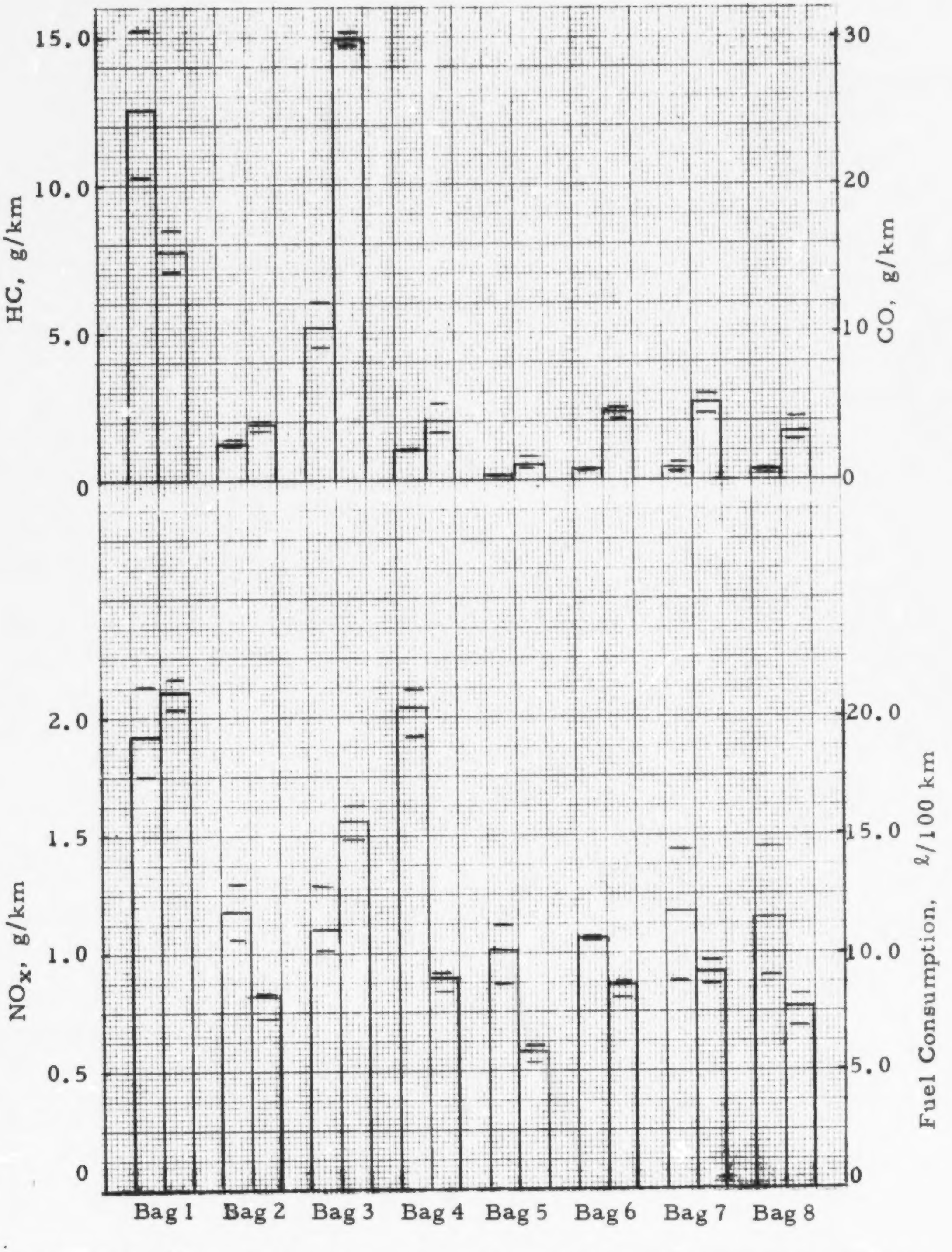

FIGURE E-13. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 16 HR SOAK
1976 Honda Civic CVCC

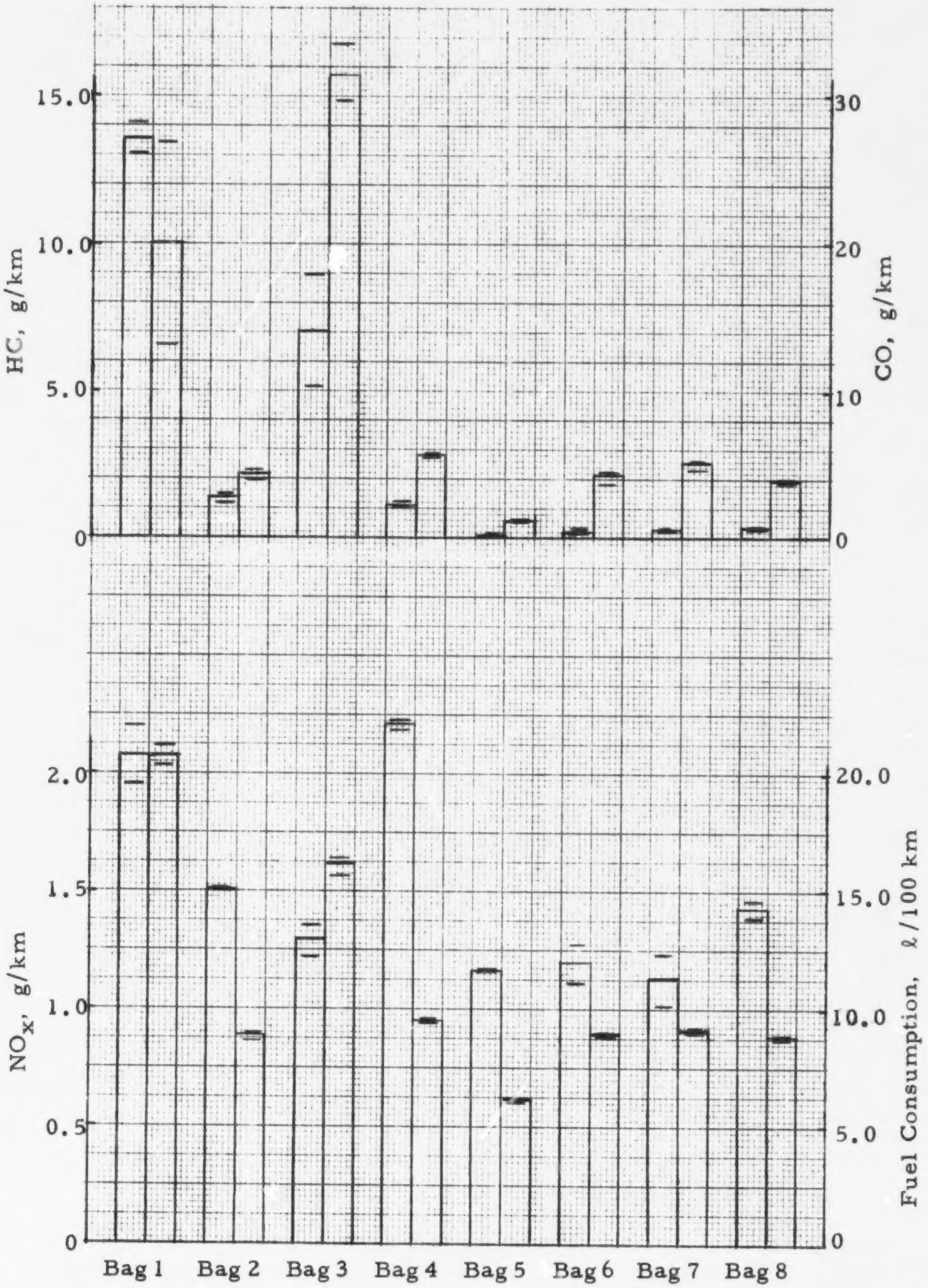

FIGURE E-14. INDIVIDUAL EIGHT BAG SEQUENCE EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS, 36 HR SOAK
1976 Honda Civic CVCC

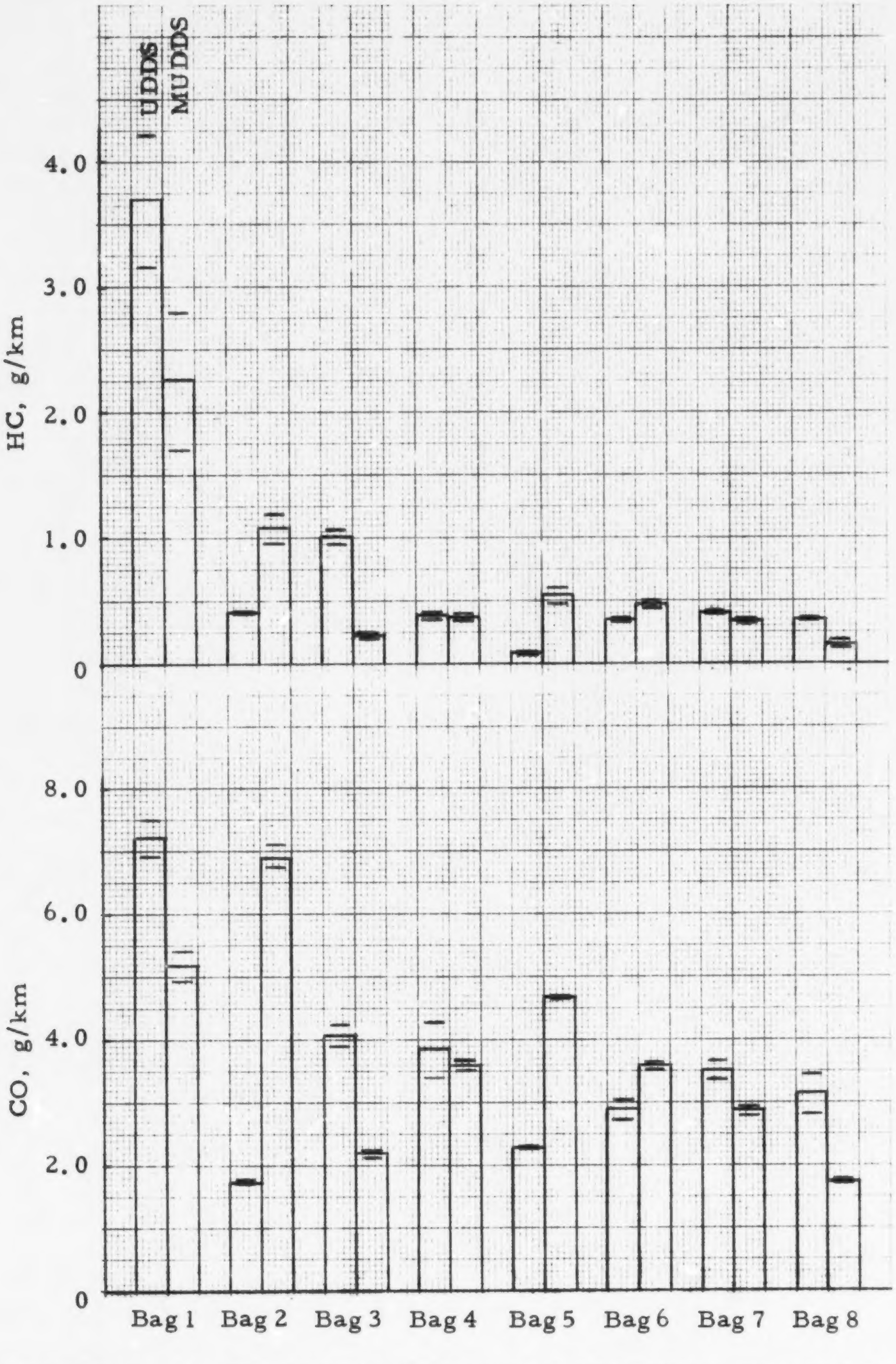

FIGURE E- 15. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1976 Honda Civic CVCC

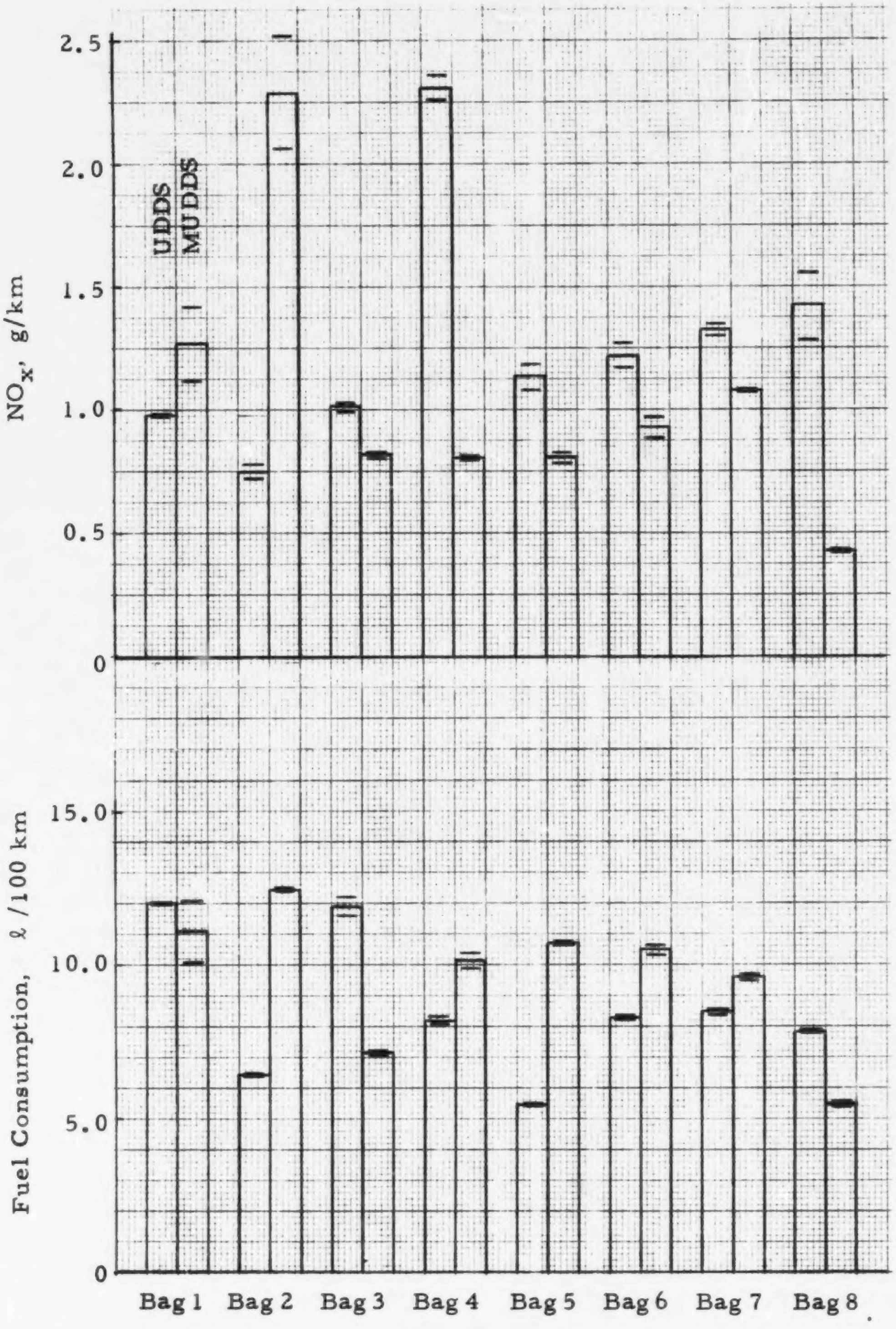

FIGURE E-16. INDIVIDUAL EIGHT BAG SEQUENCE NO_x EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 10 MINUTE SOAK
1976 Honda Civic CVCC

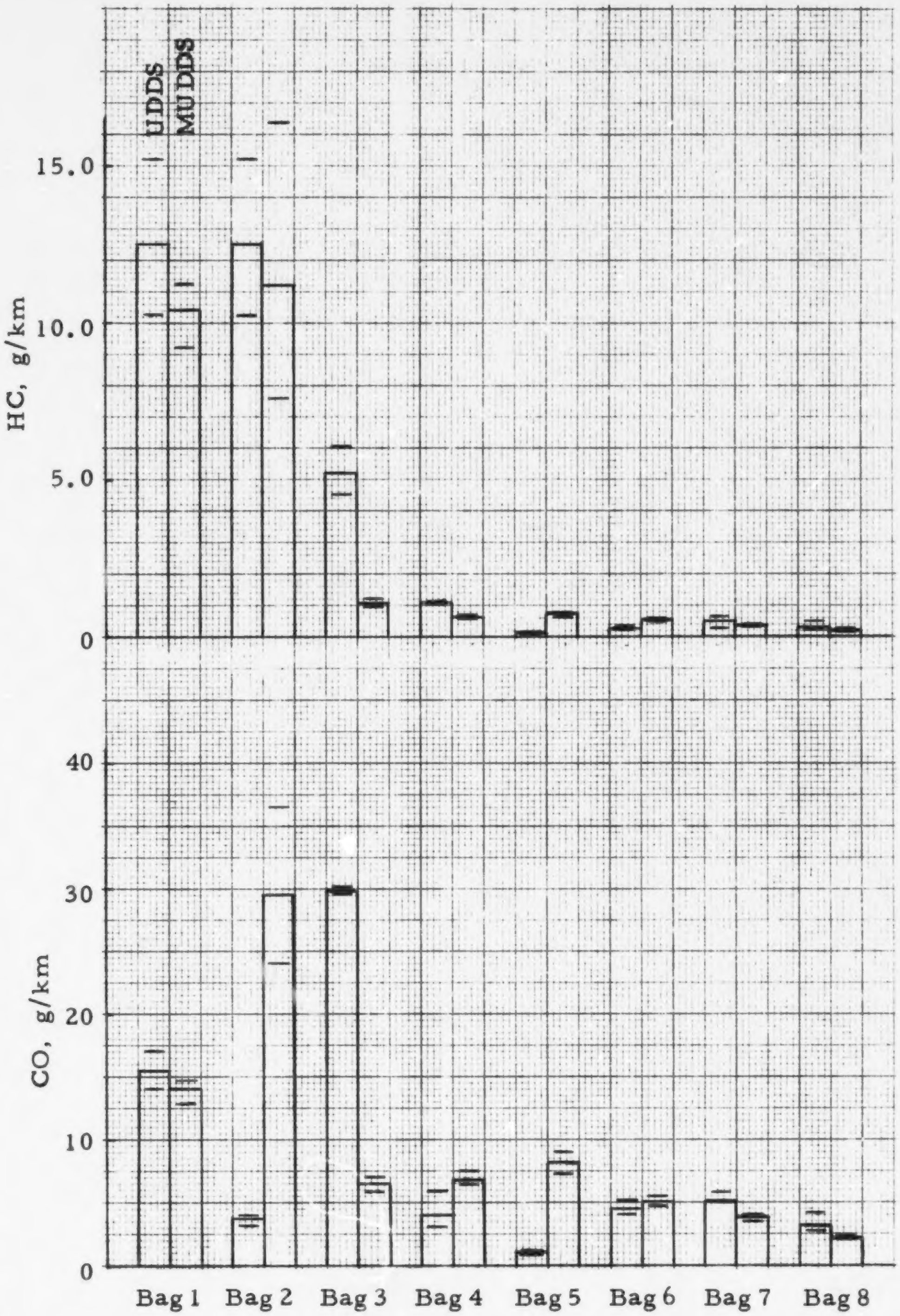

FIGURE E-17. INDIVIDUAL EIGHT BAG SEQUENCE HC AND CO EMISSION RATES DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Honda Civic CVCC

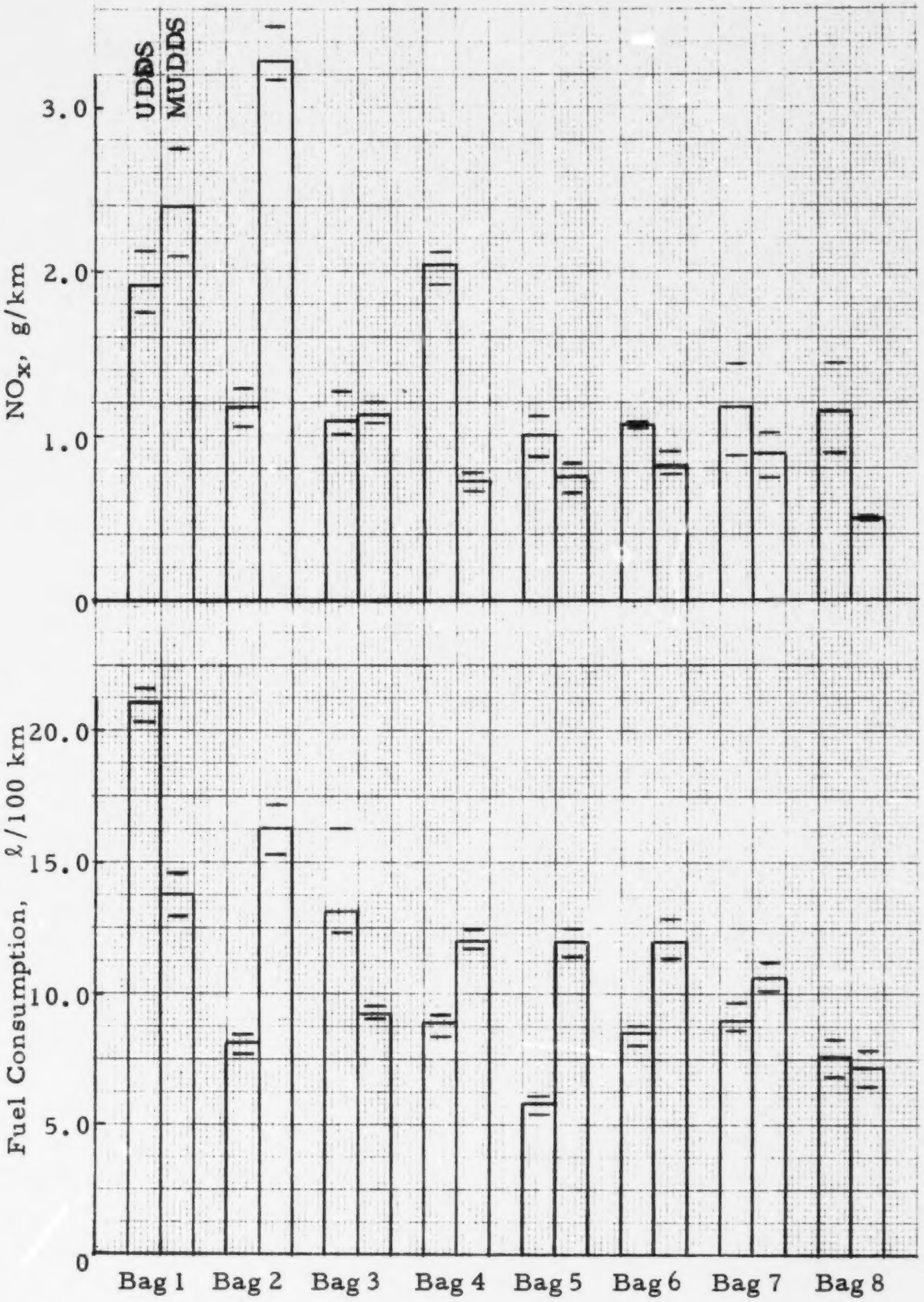

FIGURE E-18. INDIVIDUAL EIGHT BAG SEQUENCE NO$_x$ EMISSION RATES AND FUEL CONSUMPTION DURING FIRST 505 SECONDS OF UDDS AND MUDDS, 16 HR SOAK
1976 Honda Civic CVCC